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Trade Outlook.

As the months roll by it is becoming more and more apparent that the producing capacity of many industries has exceeded the ability to consume, and lower prices are not uncommon. Several works which are heavy consumers of material have closed part of their plants and reduced their working forces, although in many cases this course has been due as much to a desire to make greatly needed repairs after months of continuous operation as to any actual overproduction.

The abnormal rush of orders witnessed the past year is something that could not be expected to last forever and if conditions can be quietly rearranged whereby we may have greater uniformity in the trade at prices but little above the legitimate it is likely that we shall have several years of plenty. When we have reached a reasonable basis the undertakings which have laid dormant will probably come to the surface and add to a healthy reaction. It is to be noted also that many plants which have been operated at a profit under high prices will be forced to discontinue operation as soon as values are determined by the cost of production at modern plants and this in itself will tend to reduce production.

As far as the foundry trade is concerned signs are not wanting that the malleable business, which has experienced a wonderful expansion, has exceeded the demands of the country, and it is almost certain that several plants will find it difficult to operate at their full capacity. Such a condition was foreseen by the more experienced in the trade, but the temptation to enter a field where profits seemed large was too great for many to resist. As it is we shall probably find a gradual weakening of those who lack the managerial ability which only experience can give.

Acting in sympathy with iron, coke has receded considerable from its high mark. The Connellsville Courier states: The expected blowing out of several thousand ovens in the Connellsville region has come. Over 1,700 are reported banked and the list will be increased to over 2,000 with additions that will be made to the idle ones. Western shipments took a brace, and as a result there was an increase of over 450 cars in the output this week. This is no indication, however, of a revival of the coke boom to top notch figures. Considering the condition of the iron markets the coke operators are holding onto their high prices with a remarkably firm grip. It is now almost a certainty that deliveries for the second half of the year can be contracted for at less than $3 a ton.

Among the many opinions of present conditions which have come under our notice, we reproduce the following from "The Boilermaker," issued by Joseph T. Ryerson & Son, of Chicago, as being particularly appropriate for the occasion:

"It was easy a year ago to do business, when every purchase was profitable. The demand was ahead of the supply and shipments were all too slow. Contracts were taken out for maximum amounts and at earliest dates.

Those of us who carried large stocks saw our profits increasing daily, and even when the top was reached, there were still greater heights for us to attain. Our "commercial spree" is over, the fever is at its end and the inexorable law of supply and demand will now assume its sway in spite of attempts to dispute its sovereignty by any combination or trust. And under this law, as demand lessens, prices fall, though we think a falling price chills a demand at first.

"Every advance stimulates production and checks consumption. The productive capacity exists even after a decline, and in the case of iron and steel, new uses have been found at every low level where the relation of cost to profit is reasonable. We are all straining our eyes to find the "level" we speak of and so get on the next ascending wave of higher prices. But no reader of this will see again the prices of iron and steel of 1899!

"Iron and steel makers have many problems to face, not the least is labor. The day of small profits and large output is before us all, and our business life from this on must be adjusted to these new conditions. Brains and character are going up in value, money down.

"A year of presidential elections develops the timid man. He is generally a bank depositor and as long as he keeps it locked up, business will languish. Again, spring is not a period of activity in the iron business; winter is a long way off and crops are uncertain.

"The 'I-told-you-so' fellow is very prevalent now, and as he is right he is obnoxious. Prophesying is cheap and if man remembers what he guesses right and forgets his failures, he will, in his own mind at least, be quite a fellow. But it is no 'guess' to say this country has but one obstacle between it and the market of the world, and that is limiting the work a man may do, as in England.

"We believe as prices go lower, business held back will come forward and as the year advances activity will increase. Just think this and forget business for awhile and turn your steps to the mountains, the seashore, or the old homestead. You will return gladly then to the old desk or the sweat and dirt of the shop or mine. As one's hair grows gray and the eyes dim, the grass gets greener and the sky bluer; enjoy it when you can!"

Unauthorized Strikes.

Perhaps more hostility towards labor unions has been created and fostered by the reckless way local bodies of workmen have of laying down their tools on the smallest pretext and without the least attempt to adjust a grievance, real or imaginary, in a gentlemanly way.

It is not far from the truth to say that in most instances it is not the demands in themselves which the employer resents but the methods adopted to bring them under his attention. Many a shop manager who would good naturedly concede what is asked of him in a friendly way will refuse point blank at the least sign of intimidation and force.

Every organization, whether formed for mutual protection and benefit or for the purpose of manufacturing certain material, must act through a central body. Every great manufacturing concern has someone in authority whose orders are law and it would certainly appear ridiculously should a small portion of the stockholders attempt to prevent the fulfilling of contracts. Of course dissatisfaction may exist, but if such is the case these receive attention at stated meetings and do not form a continuous cause for rebelling.

In a similar way those who form a labor organization, having elected its officers to guide its interests and execute its laws, should see that these are carried out. Any agreements entered into between a labor organization and other bodies should certainly be respected. If the officers have erred, the remedy does not lay in a small portion of the members repudiating the actions of those whom they have placed in authority, but in taking the matter up at the proper time and place.

Some time ago the Iron Molders' Union and the National Founders' Association agreed that in case of dispute the employes should remain at work, pending a settlement of the difficulty in an amicable way. In certain localities the molders have shown an inclination to disregard this agreement and that the officers of the Molders' Union are fully alive to the importance of honestly keeping their agreement with the employers is shown in the following, taken from a recent issue of the Journal:

"With the advent of spring the desire to strike seems to become more intense among workingmen in every branch of industry, and it is the experience of the officers of the Molders' Union at least, that it is more difficult to prevent impulsive action at that season than any other. That may account for the many instances of insubordination on the part of local unions at this time, and we feel it incumbent upon us to say that local unions will find it to their advantage to adhere closely to their constitutional laws in future. The practice of sending to headquarters notification of demands about to be made and going out on the street to enforce them before a reply has been received, or, as in some cases, in spite of the instructions contained in that reply, must be stopped. Officers can not direct the affairs of the organization nor conduct a successful policy if when they give in-

structions to a local that are not to the liking of its members they endeavor to precipitate matters by going on the street. The Executive Board are unanimous in their determination to make an example of locals so offending to the extent of revoking their charter. In most of these cases local officers wire to headquarters about as follows: 'Demands refused. Men walked out. Send man at once.' We are instructed to say that local unions taking such action will have no consideration shown them. The Board will not sanction their strike nor will a man be sent. The interests of the organization are too important to be jeopardized in this manner. The laws are made to be observed and not to be violated at will, and the staunch, level-headed members of local unions should keep these remarks in mind and refuse to be dragged into a strike without the sanction and approval of the executive officers of the I. M. U. of N. A. It is only by adherence to discipline and fulfilling all obligations of the organization that you can be successful.

THE CHICAGO CONVENTION.

For the fifth time representatives of American foundries met in convention at the Great Northern Hotel, Chicago, June 5, 6 and 7. Although in point of attendance this meeting did not surpass all of the others, there was a great deal of enthusiasm manifested and those in attendance were a unit in expressing their delight in the way they were taken care of and entertained.

J. S. Seaman calls the meeting to order.

TUESDAY MORNING SESSION.

The sessions were held in what is known as the Palm Garden of the Great Northern Hotel. The first session was called to order at 11:00 a. m. Tuesday by President Seaman. W. A. Jones welcomed the delegates to Chicago and referred briefly to some of the conditions under which the trade is laboring in that city. Dr. Taylor, as representative of Mayor Harrison, also extended to the visitors the freedom of the city and assured them that no extra police precautions had been taken and that in case anyone strayed and became lost, he had only to notify the city hall officers in order to secure his instant release.

Jas. F. Lanigan propounds a few questions.

THE PRESIDENT'S REPORT.

To these addresses of welcome C. S. Bell, the much-admired ex-president of the asso-

ciation, replied, after which President Seaman made his annual report, of which we present the following excerpts.

While prices will not always remain so high as they now are, the indications are for a long continued period of prosperity based upon moderate profits.

Malcolm McDowell has the records of a few experiments with semi-steel.

That the abnormal activity in the foundry trade has brought about serious clashes between the vested interests and those depending on same is deplorable enough, though unavoidable so long as human nature is constituted as we know it. The bitterness and brute violence formerly attending such disputes seems at last to have yielded to more peaceable, and therefore, more effective means of argument. Fortunately for our association the contentions between capital and labor are far removed from its sphere of influence, and industrial education in its truest sense is the keynote of our aim and object.

Looking over the field of foundry movements during the past year we see a notable effort made in modernizing equipment, especially in the shops and the extensive additions to the old ones. It is not now a question of how much it costs, but how well will the outlay required pay. Consequently, we can see hundreds of thousands of dollars spent this year where formerly the tenth part would have seemed excessive. This can have but one result, a preponderating tendency to specialization; foundries managed by men specially trained in the economics of manufacturing; the treatment of the labor problem along lines of true political economy; and in fact quite a revolution from the numerous "all around" jobbing foundries to vast specializing industrial plants.

In this connection I commend to your attention a proposal to be brought before you later on relative to the higher training of our future foundry managers. The time when the foundry will be recognized as an integral part of the vast metallurgical field where the best talents are required and appreciated is fast approaching, and other metals so thoroughly exploited should be made to embrace the peculiar alloy of iron with carbon we have built up such an immense industry upon. May the "fittest" survive in bringing about this improvement.

While many foundries have been built during the year and numerous other ones are now greatly enlarged, the most notable advance has been made in the field of malleable and steel castings. An imposing list of these enterprises, remarkable for their financial strength, shows that these particular branches of the foundry trade have felt an unmistakable impetus of late.

What the future will bring us is hard to predict. The excessive demand caused by the actual needs of a country starved out by a long period of financial depression may hold

Jas. S. Stirling is all attention.

out just long enough to present a solution of the threatening aspect of great industrial combinations. Perhaps this solution will be simple enough when fierce competition once more reigns supreme; but time alone can tell.

SECRETARY'S REPORT.

From the report of Secretary John A. Penton we take the following:

During the year that has passed the foundrymen of America have been busier than at any period during the past decade, and from an industry that suffered as much if not

Judge French talks in a fatherly way to his Springfield friend.

more than any other on the continent as a result of the previous year's depression, it found itself suddenly participating in the revival that was as great as it was in some respects extraordinary.

While this activity, however, had all the appearances of bringing with it a proportionate amount of prosperity, yet it is well known that in proportion to the increased cost of raw material, fuel, labor, etc., the profits of the foundrymen per ton have not been in harmony with anticipations that had been formed.

In addition to this, and to add to the serious uncertainty of the situation at this time, we find everywhere a large falling off in the volume of business, and a still much more noticeable lessening of inquiries and decrease in the amount of new business offering.

While as yet the agricultural and malleable interests have suffered the most, there are not wanting signs of a lull in other lines of the foundry business that may, during the balance of this year, very visibly affect the volume of production.

While it is true that iron, all things considered, has held its own very wonderfully, and that stocks on hand have not increased materially, there is no doubt that a gradual shading of prices has been inaugurated that bids fair to continue for some time to come.

It is conceded by all producers, as well as consumers, that this is inevitable—the only question being the speed with which the market is likely to decline, and this will probably be determined by causes that can neither be foreseen nor controlled.

The far-seeing foundryman who realizes the unsubstantial character of anything that savors of a "boom" never fails, however, to continue his efforts to reduce cost by a close study of every condition that affects his production; and this accounts for the fact that there has never been a period in our history when as much attention has been given to economical appliances and methods for the rapid, efficient and cheaper production of castings of every kind.

The construction of patterns and core-boxes, both large and small, especially when much duplication is possible, is now closely scrutinized and carefully studied to such an extent that the improvement being made from year to year in this department alone requires constant attention if one desires to keep abreast of the times.

The many changes, some of them, of course, of a minor nature, that are being constantly made in follow-boards, clamps, flasks and similar devices, amount to a great

H. P. Deuscher enjoys himself quietly.

deal in the aggregate, and it is surprising to note what ingenuity can accomplish even in these respects, and the great difference that exists between foundries doing oftentimes the same kind of work.

But the greatest revolution of all has been

made by the molding machine. No one would have been warranted in predicting five years ago what would have been possible of accomplishment in 1900 in this respect. It is true, of course, that in a vague sort of way an optimistic foundryman would say that great things were likely to be consummated.

M. J. Keep shows the figures to prove it.

but there was no exact data upon which to base any conclusion other than a general feeling that we have been drifting "machinewards."

The growth of the machine in popular favor, and the universal appreciation of its adaptability to a wide range of work has been most remarkable, and every day brings new converts to the already large army of believers in its increasing utility.

Patterns that it was thought a few years ago must always be molded by hand are now successfully made on some of the many types of machines that are on the market, and foundrymen who have, with a conservatism worthy of a better cause, been clinging tenaciously to old methods, have been compelled to see the splendid results their own competitors on similar kinds of work have been securing, and are beginning to feel the pressure that the machine exerts as an economizer and competitor.

Just where the line must be drawn between the possible and the impossible in this respect is hard to say, but is it not fair to assume that the thought the advent of the machine has inspired towards systematizing, may permeate the manufacture of castings of a larger size, and result to the benefit of the advanced foundryman in that line also by an improvement in some method or other?

The machine has brought strongly to the front the fact that there is a factor that must be reckoned with in the management of the foundry which does not view with favor its rapid introduction, viz.: Labor and Labor Organizations.

The molder, or his union, have placed themselves on record as not being opposed to the machine, but on the contrary are so much in favor of it that they are inclined to insist upon its control being put in their hands to the extent that none but union men should be employed to operate it.

The irony of this is, of course, self-evident, and no one, not even the union advocates of that policy are deceived as to what it means, viz., "restricted output."

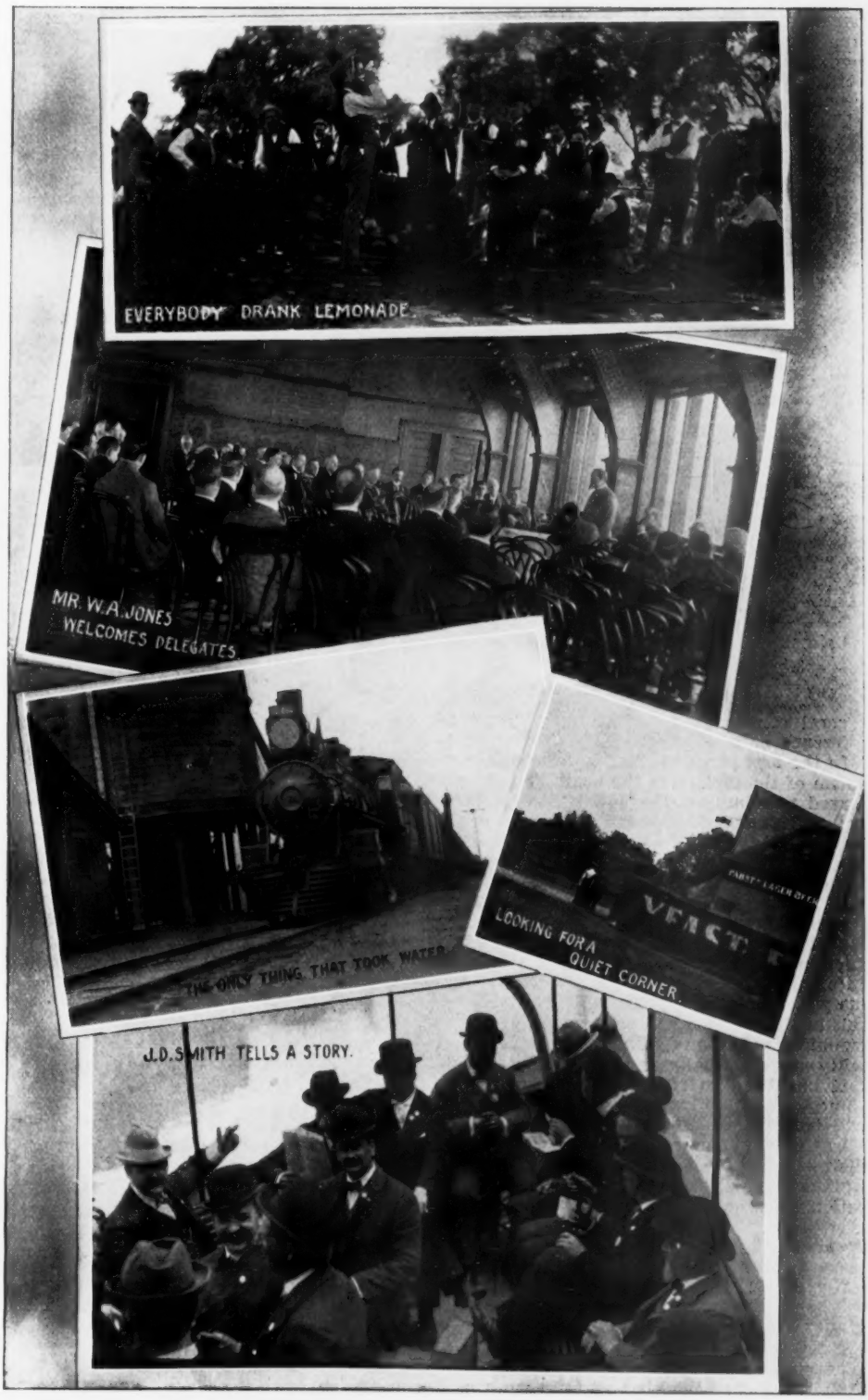
It is a very grave question as to whether or not the molder is so seriously handicapped by education, environment and association in the efforts to bring out the machine's best possibilities.

If he is a good molder, he will not care to work upon a machine whose operation is only manual labor of a severe kind. He will not be as interested in this work as in the production of a mold that requires from him a degree of artistic skill, and as a result of his having had inoculated into his system a sort of reverence for the unwritten law of the "set day's work" he lacks the interest that is taken by the laborer to whom the operation is never other than that of laboring, who makes no unnecessary steps or needless

C. S. Bell is a familiar figure.

moves, and with whom the only law that regulates or controls his output is his own efficiency.

Instances are plenty where the introduction of the machine has been opposed unless a union man willed to operate it, and as this


EVERYBODY DRANK LEMONADE.
MR. W.A. JONES WELCOMES DELEGATES.
THE ONLY THING THAT TOOK WATER.
LOOKING FOR A QUIET CORNER.
J.D. SMITH TELLS A STORY.

meant no advantage to the proprietors the machine is, of course, of no value, and that proprietor is not permitted to produce the castings he requires in the way he may select, or as cheaply, perhaps, as his competitor not hampered with such restrictions.

There are, as a result of this condition,

R. I. Findley catches a point.

several consequences which may admit of reference here.

In the first place the real or fancied antagonism of the molder to the machine has only served to stimulate the activities of inventors, machine-producers and foundry proprietors, and it is possible that the machine may have received in some degree an impetus from this source.

In the second place, the fact that it is antagonized, and the fear that it may be antagonized, may prevent temporarily its introduction or more general use, but this very antagonism must operate as a sort of stimulus which sooner or later will inevitably result in the introduction and operation of the machine, or in any other contrivance that will serve eventually as a cost-reducer.

It has been so from the first, when machines of any kind were opposed, and always will be.

In the line of new foundry structures, and their suitability for the particular class of work for which they are designed, their location, etc., more and more is being done every day, and the number of plants in existence that might be called model in every respect are steadily on the increase.

Not only that, but the improvements that are being constantly made in such items as cranes, ladles, core-ovens, annealing-ovens, conveyors, tracks, etc., and their still more general adoption, are all evidence that the foundrymen are thinking and studying, and that in the near future it will be a difficult matter to remain in the business successfully unless close attention is given to every detail in these respects.

Then we have those who have given up much of their valuable time to the study of iron and its value, and to whom the foundry world must always owe a debt of gratitude for their unselfish labor.

It must be conceded that relatively speaking and in proportion to the interests and number of men involved, that labor troubles have not been as frequent in the foundry or iron business the past season as they have in other lines, and while it may be too early to offer any predictions, yet, it is hoped, and I am sure all will join me in the desire that such arrangements may yet be perfected between foundry employes and employers as will for all time bring about more close and harmonious relations, and set a precedent for employers in other lines to follow.

Howard Evans, the popular treasurer of the association, was detained at home by sickness. Upon the receipt of a telegram from Mr. Evans saying: "May your meeting be a howling good one," a committee was appointed to send an appropriate response, voicing the regret of those present that Mr. Evans could not be with them in person.

Dr. Moldenke explains a theory.

STANDARDIZING THE TESTING OF CAST IRON.

Dr. Richard Moldenke, chairman of the committee on "Standardizing the Testing of Cast Iron," followed with a report, showing the progress made during the year, in which he said in part:

The phenomenal activity of the trade has naturally been felt very keenly by us all, so much so that it took three months of unremitting effort on the part of one member to cast the two partial sets of bars tested during the year. Another member of the committee, who is trying to give us two other

S. T. Johnston enjoys the proceedings.

sets of test bars, has vainly been endeavoring to do so for the greater part of the year. While this state of affairs is rather discouraging to the testing industry, yet it must not be forgotten that the years of prosperity are not always those of progress. The lean years give more leisure for investigation and bring with them a greater incentive to experiment and improvement.

The series of special tests promised us by our friends last year have finally failed us, but will be taken up in order just the same, as time permits. On the other hand, the work, as far as it has gone, has attracted wide attention in Europe as well as in this country, the hearty support and kindly criticisms of many investigators forming a gratifying acknowledgment of the sincerity of purpose on our part. We wish to record the kindly services rendered the committee by the Pittsburg Testing Laboratory and the Riehle Bros.' Testing Machine Co., the former for their ready help on the chemical and physical work connected with the smaller sizes of the test bars, and the latter for the tests made on the largest sections, which ran far beyond the range of ordinary work.

We are glad to note that impact testing is securing special attention at the hands of several testing experts. One small set of bars have been prepared by us for Prof. Hatt, of Purdue University, which he will test in conjunction with steel and iron specimens on his new machine for testing by impact bars which are at the same time under tensile or compressive strain.

The American Foundrymen's Association has been specially complimented for its high standing on questions relating to cast iron by the appointment of one member of your committee on the special work of the American section of the "International Association for Testing Materials" on the investigation of the magnetic properties of iron and steel used for electrical purposes. The work of studying our foundry product for commercial uses is just beginning and the American Foundrymen's Association is certainly destined to take a most active part in it.

REPORT OF STANDARDIZING BUREAU.

Following Dr. Moldenke, Mr. Thos. D. West as chairman of the American Foundrymen's Association Standardizing Bureau, presented a detailed report covering the work of that committee up to date. From it we gather that not only has the work of the committee been successful in an educational way but also financially. The number of

F. B. Farnsworth thinks of the future foundryman.

laboratories which have adopted the Association's standardized drillings has increased to 149. Two of these are in Germany, one in England, two in Australia, one in Nova Sco-

tia, three in Canada and one hundred and forty in the United States.

The report states that "it has taken zealous and persistent labor on the part of the committee to achieve the above result. In starting this work, about two years ago, it

W. R. Rogers, of Rogers, Brown & Co., explains present condition in the iron market.

took personal solicitation to secure orders and get laboratories interested in the work. Many queer ideas and much prejudice had to be met and overcome before some chemists would approve the adoption of the Association's standards. However, it is a pleasure to note that those who have used these standards are heartily praising their excellence and value. A great obstacle to be overcome in introducing these standards was the doubtful practice of different chemists making their own standards. It had to be shown that such procedure failed signally in obtaining a uniform set of standards for universal exchange."

John A. Penton, as secretary of the Association, called the attention of the members to the vast amount of work which had been performed by Messrs. Moldenke and West, his remarks being seconded by James S. Sterling and W. A. Jones. Upon motion a vote expressing the thanks of the association to Messrs. Moldenke and West was passed unanimously.

TUESDAY AFTERNOON SESSION.

At the Tuesday afternoon session the first paper taken up was that of Edward Kirk, entitled:

THE TRAINING OF FOUNDRY CHEMISTS.

BY DR. EDWARD KIRK.

Permit me to present for your consideration a few thoughts upon foundry chemistry and the proper training of foundry chemists.

At the present time there is not an institution of learning in this country that gives a practical course in foundry iron chemistry or foundry chemistry. While the employment of chemists in foundry practise has been strongly advocated for a number of years by the various foundrymen's associations and leading founders, they have failed to take any steps whatever to provide chemists educated for this work. And, at the present

Geo. M. Millard looking for the trade reports.

time, it is impossible to obtain from the graduating class from any of our colleges or schools a single chemist that is capable of doing anything as a foundry chemist, save making analyses of irons.

Not only are there no schools for the proper training of foundry chemists, but there are practically none for the teaching of foundry practise, while many other industries are taught at boys' mechanical training schools, at which boys are given a tech-

AT THE
CONTROLLING WORKS
AT LOCKPORT
JOHN HILL TELLS
CHAS MOHLMANN
HOW TO USE PLUMBAGO
CRIVEL AND SLOAN
SPIN A FEW YARNS
WAITING FOR ORDERS.

nical education in the line of the industry preparatory to learning a trade.

To prepare a student to become a chemist in foundry iron, he should be given a practical course in analysis of coke, coal, iron, and the mixing of irons from analysis that will enable him to produce from his analysis

Fred'k W. Sturyer listens to a paper touching chemistry in the foundry.

an iron at the cupola spout having any degree of hardness, softness and strength required in the various grades of work to be cast.

And he should be given a practical course in cupola management in every detail, from the chipping out of a cupola to the dropping of the bottom. To prepare a student for a foundry chemist, as well as an iron chemist, he should be given a practical course in anaylsis of coal, coke, iron, fire brick, clay, loams, sands, facing, and all materials employed in foundries.

When employed at a foundry, he should be competent to not only manage a cupola and produce irons suitable for the various grades of castings, but he should be competent to determine by analysis whether a sand is a good molding sand or not; if sands are suitable for heavy or light castings; if a facing or blacking will peel the sand from heavy or light work and give a smooth surface. And he should determine by analysis the suitability of all foundry materials for the purpose to which they are employed in foundries, the suitability of which is now determined by trial of material—and loss in many cases from poor material.

With a chemist properly trained in the analyzing, mixing and melting of irons, foundry irons can, no doubt, be greatly improved. With a chemist properly trained as a foundry chemist, foundry practise, in my opinion, can be revolutionized and a much higher grade of castings produced at a less cost than at the present time.

To educate chemists for this work a thorough, practical course in foundry chemistry should be established as one of the courses of the curricula of all large technical schools. To prepare boys for learning the art of molding and better fit them for foremen and managers of foundries, a course in technical and practical foundry practise should be advocated at all the boys' mechanical training schools in this country.

These thoughts are respectfully submitted for your consideration, and should they meet with your approval, I would suggest that the American Foundrymen's Association, as a representative body, call the attention of the institutions of learning to the demand for practical chemists and founders, and urge them to take the necessary steps to supply the demand.

VIEWS ON PRESENT SYSTEM.

Under the present system of foundry chemistry, as advocated by some of our leading founders and practiced in some foundries, the chemist is only required to make an analysis for the founder or foreman from which to make mixtures of iron, and the

Geo. M. Cope takes a few notes.

chemist is only responsible for the accuracy of his determination. That this system does not give satisfactory results is clearly indicated by the mall number of foundries employing chemists and failure to improve the quality of foundry iron under this system.

The chemist should not only be given charge of the laboratory, but should be given full charge of the cupola, the mixing and melting of irons, and be held responsible for the quality of iron at the spout. This is the practice in every foundry in which chemistry has been a real success.

E. M. Anthony becomes interested.

At one of the largest and best known foundries in this country, at which a chemist has been employed for many years, the chemist has full charge of the laboratory, cupola and iron, and is not only responsible for iron at the spout, but has been under a written guarantee for years to produce iron at the spout having the density, hardness, softness, strength, etc., called for in specifications for government and other engineering work.

At this foundry, castings are made in the same heat weighing from a few ounces to many tons, for all of which a suitable iron must be provided. That a properly educated chemist can produce such irons at the spout has been clearly demonstrated at this works.

SILICON BASIS.

The silicon basis system in foundry irons has enabled the founder to produce castings with a little more certainty as to the degree of hardness and softness than by the fracture system. Beyond this it has been of no advantage to the founder, and to the foundry industry it has been a decided disadvantage, and if persisted in, will ruin the industry.

This may seem a broad assertion to those who have not investigated the matter, but those who have will, no doubt, fully agree with me.

That silicon reduces the strength of cast iron is a well known fact; and that the greater certainty in the degree of hardness and softness in castings is at the expense of the quality of iron is also a well-established fact.

Since the introduction of this system, it has been the aim of almost every furnaceman making foundry iron to increase the percent of silicon in his iron. And silicon has been increased to so great an extent that the quality of foundry iron has been greatly reduced; and the practical founder is no longer working for high silicon irons, but for an iron low in silicon or free from it, that his casting may have strength and other desirable properties that are destroyed by silicon in cast iron.

What the founder wants, to hold his own against steel is a foundry iron having all the characteristics of the hot and cold blast charcoal foundry irons of forty years ago. That such an iron cannot be produced by the silicon basis system is a well known fact to every practical iron chemist, and the sooner it is discarded and the true basis for the manufacture and mixing of foundry irons sought for, the better it will be for the foundry industry.

Many lines of castings, amounting to thousands of tons yearly, have been lost to steel. Many more will be lost if something is not done to improve the quality of foundry irons.

It is high time, gentlemen, that you rouse from your slumbers and gird on your armor in defense of your industry. If you do not,

M. B. Easton, of Fraser & Chalmers extends the glad hand.

your foundry plants will be left to rot as have the rolling-mill plants of this country; for this is the age of steel, and only by an improvement of foundry iron can the founder hold his own against it.

DISCUSSION.

Mr. West presented some arguments in rebuttal of several of Dr. Kirk's statements, after which he read the following paper, giving his views on the same subjects:

TRAINING STUDENTS IN THE PRINCIPLES OF FOUNDING.

BY THOS. D. WEST.

For some eight years or more attention has been called by writers to the desirability of colleges training students in the art of founding. A few colleges have fitted up departments for such training, and in some instances have adopted the writer's works to assist them in imparting instruction. Mention is made of this fact at the start merely to show that there is a want and that some colleges are making efforts to fill it.

Recent discussion on this subject might lead to the conclusion that I am opposed to colleges giving instruction in founding. This is due to my objection to educating chemists to the assumption of entire responsibility for results in mixing and melting iron for general founding, as recently advocated by Dr. Kirk and others. Some may have attributed my objections on this point to prejudice, but any doing so are mistaken, for I can show the contrary by the fact that for a year or more I have had a work under way, designed especially for the use of colleges in

Stanley G. Flagg looking for a Malleable man.

training students in the principles of founding. The difference is that I do not limit the chemist or student to an understanding of the principles of cupola work only.

If the chemist is taken out of his laboratory to assume any responsibility for results of mixtures or melting, he should also be competent to assume responsibility for molding, as in the majority of foundries to divide responsibility of the mixing and melting from the molding can only cause contention,

M. C. Armour listens to Dr. Moldenke's arguments.

often with heavy losses, to all financially interested. Why this is so is best known to those having experience in the superintendency of general founding. It is also exemplified in nearly every instance in which the chemist has been led out by proprietors to take charge of mixing metals or the cupola work on account of assumed inability of the foundry foreman, as can be read between the lines of chemists' writings, suggesting that the responsibility of the mixing and melting be placed in their hands.

It is not to be understood that I would place any obstacles in the way of the chemist learning all he can about the mixing of metals and cupola work, etc. On the contrary I would have him extend his knowledge in these lines all that is possible, as this cannot but make him more profitable to his employers as a chemist. He can certainly be of assistance to the foundry foreman or superintendent who may be thought to require aid in attaining desired ends, just as the foundryman is often dependent upon the designer, pattern maker, machinist or blacksmith, to enable him to achieve desired ends in making good castings.

Founders experienced in general work, have been too tolerant in sitting idly by and allowing specialists and inexperienced founders to contend constantly for false theories and incorrect practices. The injury thus

wrought is well evidenced by a perusal of the attractions of some of our best engineering societies. Papers appear in them that for impracticability are amazing and it is safe to say that there would be very general censure for like error if disseminated in any other profession. The great evil of such writ-

Adam M. Bair keeps the Milwaukee Railroad agoing.

ings is in influencing those of narrow experience to believe the false theories and practices advanced and to create a contention very harmful to the progress of founding, because of writers sticking to false theories and practices that they had in the beginning advocated not knowing they were in error. The time has come to call a halt upon the forces retarding the advancement of real skill in founding, a calling which, as the engineering world has lately come to discover, possesses extraordinary scope for the employment of the highest intelligence and far surpasses all other trades in demanding the best of the true emchanic.

While there has been this awakening lately to the scientific methods and the skill involved in successful founding, and many bright minds are striving to elevate the trade, its progress is hindered in one way by reason of specializing in the manufacture of castings. This most seriously limits the opportunity to obtain the full knowledge and experience formerly within reach of nearly all who were engaged in the manufacture of castings, for the founders of the old days generally did a jobbing business.

The lack of the all-around operations of the past, which afforded an opportunity to get a broad knowledge of the art of founding is apparent to experienced molders and founders, in altogether too many articles appearing at the present day. A volume could be filled with different examples of evils resulting from the ill conception of the knowledge, judgment and skill required in founding, and only obtainable by broad schooling in the art. The question is, how can steps be taken to remedy such evils and prevent matters from going from bad to worse. We can expect little assistance from the specialty shops, for even if they did make an effort to give the broadest education possible it would be poor at best. We must look in other directions.

What will seem strange to many is the inability of most of our present shops to give those who are coming along the knowledge that should be obtainable. Yet this is readily understood by experienced superintendents or foremen of heavy work foundries, for in all such shops, the ordinary founder or molder, although he may work a lifetime, day in and day out, alongside the leading men, can never be brought to realize what experience, skill, judgment and caution are requisite in order to make a founder or molder one to be recognized as a leader in the art. It is chiefly to the principles of heavy founding that we must look for the education of those desiring a thorough knowledge of the art of founding.

Willis Brown advocates some changes in the by-laws.

and the more varied the knowledge they have of the principles underlying work in green sand, dry sand and loam molding, the more thorough will they be, and the better fitted to assist in protecting and advancing the art of founding.

It will be noticed that an understanding of the principles involved in founding and not the possession of experience is cited above, as aiding the founder to achieve results. Of course, if we can possess an understanding of principles, combined with experience, the

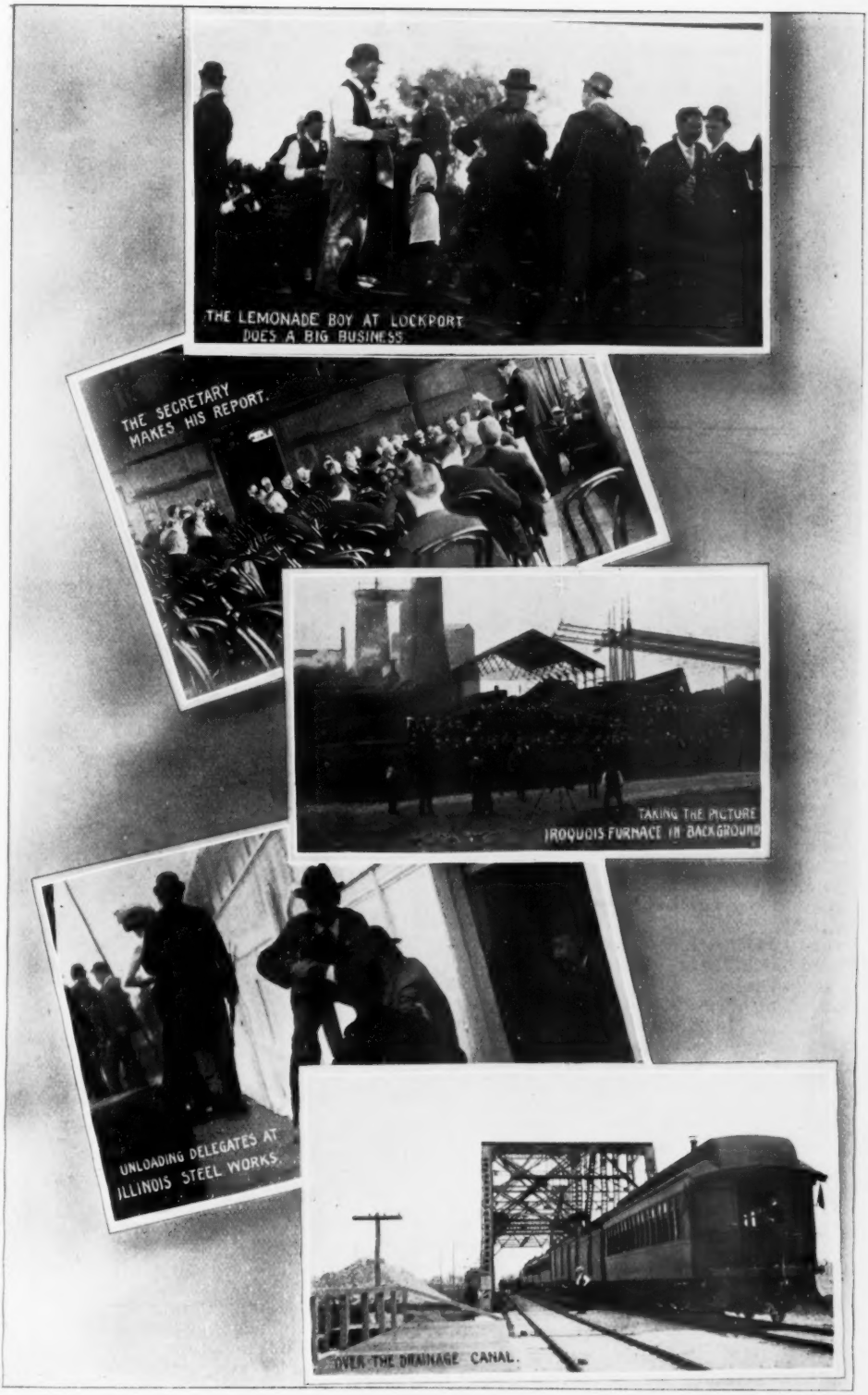
C. L. Bauer wonders who is getting the worst of it, he or the sandwich.

better qualified are we for understanding and following the pursuits of the founder and molder. It will seem strange to those unskilled in founding, to be told that a founder or molder can be experienced in doing actual work and still lack knowledge of the principles involved in the art, or of the work he may have in hand. But it is a fact that there are many examples. What successes such founders and molders had were chiefly due to their imitating those gone before, whose knowledge had been obtained largely by sad and expensive experiences. These in many cases could have been avoided, had the founder or molder understood the principles involved in the work in hand. It is here that the value of foundry literature is seen, as by this means the results of one man's studies can be transmitted to others and enable them to be benefited by his discoveries. Foundry literature largely supplies the means of saving foundry practice from decay, due to specializing in the manufacture of castings. This tendency might, at length, cause all-around founding to be numbered with the lost arts, and bring great injury to its commercial interests, through uninformed competition. The worst evils of to-day are to be found in the ill-conception would-be founders entertain of the difficulties awaiting inexperienced men who enter the foundry business following the maxim, "Fools rush in where angels fear to tread."

We have several works on founding which any desiring to acquire the principles involved may study with profit. But that these works may do the greatest good, it is necessary to have the principles of founding exhibited in actual workings. How best to do this is a question on which the writer has views to be expressed later on. Some may advise a novice or student to secure opportunities in one of the few general casting shops. This would work very well, providing instructors could be obtained that understood the principles of the work they were doing, and had the ingenuity to originate methods of teaching them, but as explained above, founders and molders, as a rule have depended more upon shop experiences than upon a study of underlying principles, in attaining what proficiency they possess. For the man who intends to earn his living by actual work on the floor or at the cupola, a certain amount of actual shop experience is necessary; and by being a good observer, and following methods taught by skilled hands, he gets along without possessing much knowledge of principles. But for the man who aims to be a writer, proprietor, president, general manager, chemist or designer of

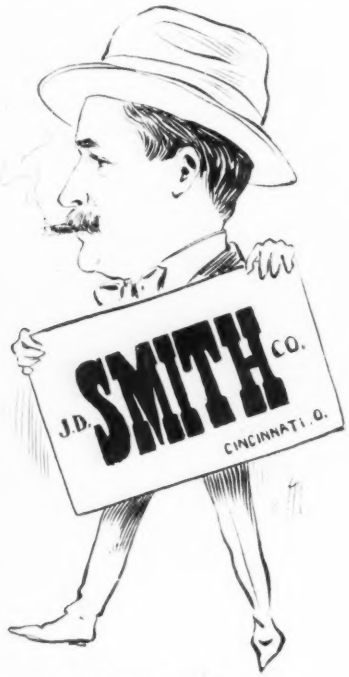
C. J. Wolff was the dude of the delegates.

foundry work, it is very essential that he at least understands the principles involved in scientific and commercial founding. If this cannot be obtained in the shops of general foundries, then I would suggest that colleges


THE LEMONADE BOY AT LOCKPORT
DOES A BIG BUSINESS
THE SECRETARY
MAKES HIS REPORT.
TAKING THE PICTURE
IROQUOIS FURNACE IN BACKGROUND
UNLOADING DELEGATES AT
ILLINOIS STEEL WORKS.
OVER THE DRAINAGE CANAL.

fit up so as to give opportunities for such instruction.

Why should not colleges equip their graduates in the science and art of founding as they do in machine shop or blacksmith work? Many graduates of the past wish they had had such foundry training. There are very



This is not an advertisement.

few presidents or general managers of iron works having foundries, but feel at home in the machine or blacksmith shop, and would like to do so in the foundry. But as to the latter they are generally dependent entirely upon the judgment and management of subordinates, which arrangement, as a rule, give the head officials more worry and losses than all else under their charge. There is no good reason why colleges could not give instruction in scientific and commercial founding that would be of great practical value to the graduate whether he be engineer or chemist.

What is required of colleges at the present day is that their course in founding be so laid out and systematized as to impress upon the student in a lasting way what is practical and meritorious in general founding. Then when a graduate passes through a foundry in after life, his equipment will be such as to give him a fair understanding whether work is being properly done or when trouble arises to assist in devising remedies. He should be able also to judge of what is meritorious in the writings of those laying claim to experimental knowledge of founding. The evils of the present methods of college instruction in founding are similar to those of the specialty shop, in that they afford but a smattering of what is true founding and result in the same injury to the trade that is now seen on every hand by reason of the general lack of a more thorough knowledge of broad founding.

In college instruction it is not necessary that castings of every character should be made, or for that matter castings of any great weight. What is wanted more is a course of instruction which will demonstrate good and bad results, by different methods in the molding of green sand, dry sand and loam work castings, with explanations for both conditions, to be followed by illustrations of the principles involved. Such work, if properly carried out, as it can be, would give an impetus to the advancement of the foundry art such as we have not known.

Establishing such a foundry school for a creation of competent managers would be a laudable work, for any one who could donate from $30,000 to $50,000, whether it be given to colleges or the American Foundrymen's Association, to be properly placed. Having such a gift to start with, an institution could be carried forward to a great credit to the donor, to the trade and to all others interested in its success. An institution for the technical training of students in the principles of scientific and commercial founding

H. H. Roberts enrolling the newcomers.

would naturally create a strong rivalry between the technical and practical men for high-paid positions. If practical men would strive more to understand the scientific basis of commercial founding as the students would do under the plan herein advocated and add a mastery of the science to their

shop experience, they need never fear the technical man replacing them. If, on the other hand, they are going to remain asleep and not keep up with the progress of founding as appears, for example, in the slowness of many foremen and molders to study the making of mixtures by analyses and to un-

Sloan passes souvenirs.

derstand cupola work, the so-called practical men will find it merely a question of "the survival of the fittest." It will be but a little time when they will have to take a back seat and become nonentities in the estimation of the mechanical world, never commanding any pay above the ordinary mechanic. The writer has seen this danger for some years and in preparing literature has sought to put means in the hands of practical men, whereby with a little study they could hold their supremacy. It is my hope that this paper may awaken many from the indifference they now exhibit to the forces that are slowly relegating many "practical men" to the rear.

It is for the best interest of the trade that every means be used to induce the practical man to become a capable overseer of the mixing of metals by analyses and a master of cupola work as well as of the floor. The foundry which is compelled to divide such responsibilities is lacking in internal harmony and economy of production, as indicated in the beginning of this paper. Such advancement for the practical man need not injure the technical man's chances of congenial and remunerative occupation, for there is room for him at the top as president, consulting or designing engineer or chemist. For in any of these positions, if thoroughly conversant with the principles of scientific founding, he cannot but be of greater value to his firm and success will be more pronounced when he is seconded by the practical foundry superintendent or foreman, who always prefers to be under the supervision of a president or general manager possessing some practical knowledge of founding.

DISCUSSION.

Touching upon some of the points brought out in Mr. West's paper, Robert H. Richards, Professor of Mining and Metallurgy, Massachusetts Institute of Technology, contributed the following written discussion, entitled

THE DEVELOPMENT OF THE FOUNDRY BUSINESS.

I have been asked to write my views upon this subject partly, perhaps, because I am much interested in the problem, and partly through my experience in developing a successful school of metallurgy.

That men trained in scientific and commercial founding are needed, is now generally acknowledged.

John G. Sadlier enjoys the scenery along the drainage canal.

Business men and practical founders admit that advances are to be looked for along the lines of correct chemical mixing of the charge and of correct temperature of melting and pouring.

The question comes up, who is to direct this advance?

The practical foundryman, thoroughly

trained in shop details, has become habituated to the guidance of arbitrary rules and is, therefore, not well fitted to collect and arrange his facts and draw conclusions therefrom. On the other hand this is exactly the quality the scientifically trained man possesses in a high degree. But while the latter has this quality, there have been mistakes made in using him. It is a mistake to put a young chemist or even metallurgist into a laboratory and to call upon him to prescribe mixtures for casting when he has never had any foundry experience, and when the question of the temperature of the metal at the time of melting or pouring has never even presented itself to him. He does not possess the information needed to produce the desired result, and he is liable to make mistakes and bring discredit on himself and his training.

The solution of the difficulty will come by combining the scientific knowledge with the practical experience to the advantage of both.

Progress can only be made by experiment. The business man must be willing to spend a little money in experiments. The scientific worker, on the other hand, must be willing to assume a speed of progress that is sufficiently slow to be a guarantee against any serious mistakes.

In ocean navigation, compare the step which produced the Great Eastern with those that produced the Saxonia. The former was one long stride in advance and a great mistake, the latter shows a series of small steps and is a great success. Compare also the Ormsby iron furnace with the Duquesne furnaces. The former was a long step and a great failure, the latter have arrived at success by a great many small steps, each logically following the previous one.

How can the scientific and the practical training best be brought together? This

In the Wake of the Soo City.

seems to be the chief question at issue at the present time.

A young metallurgist just graduated from a first-class scientific school, if he has average skill with his hands, should be put to work in the molding room of a foundry. This will teach him the principles of molding, of the use of patterns, of melting and of pouring, even if he does not stay at it long enough to become a skilled workman. Most important of all, it will gain him the respect of the foreman. He should then go to work in the chemical laboratory, noting the make-up of charges, analyzing the castings resulting therefrom, determining temperatures by calorimeter or pyrometer of the melting and pouring.

B. T. Bacon passes a couple of favorite brands.

His school work has taught him keenness to see, to understand and to recognize possibilities. His molding experience has taught him the direction in which he must look. His chemical laboratory and pyrometer now come in use to collect the facts and to record the conditions of each cast. This information is accumulated rapidly, is arranged and catalogued according to the size of casting made, the quality of metal and the purpose for which the casting was designed.

To make this scheme a success, there are a number of points that the manager will naturally look out for. He will direct the young man to put himself under the foreman's guidance, to seek to satisfy him in every way, and will caution him not to try any experiments until he has collected many facts, to begin experiments cautiously, not running risks of too great a jump in the dark.

The experiment tried in the Builders' Iron Foundry of Providence of putting college students into the molding shop during the vacation is a good one, and will undoubtedly

develop some first-rate men. Men from high class scientific schools would, however, in my opinion reach the goal quicker and with equally good or better final results.

The placing of pattern making and foundry work in the curriculum of a school is

J. H. Whiting has a monument of his own.

good where the result sought is a mechanical engineer. I do not favor it, however, for turning out metallurgists for foundry work. First, because it can be better learned in the foundry, and second because the time consumed by it at school can better be devoted to other training which the foundry cannot give. It is, therefore, in a sense, time wasted.

The graduates of the best schools of metallurgy of to-day, with a course of shop practice at the works, either in vacations or after graduation, will be found admirably fitted to pursue this vocation and to bring it to a high state of development.

This is not a theoretical opinion; it is a fact proved by several graduates of the scientific school in which I am interested.

Following this, a number of members responded to the invitation to discuss the general question of the better training of future foundry managers. C. S. Bell was ready to agree with nearly all that Mr. West's paper brought out. No mechanical trade is so entirely dependent upon the judgment of the operator as that of the founder. You might as well make an athlete from the study of books as to try to make a foundryman from an education in chemistry. College education is valuable to the foundryman—there is no dispute about that; but college education will no more make a foundryman than it will make an attorney or a physician or a minister. There must be a genius for founding in the man who successfully follows that work. Some people who want to, go by rule, but rules and principles and theory will not make a foundryman. All that the books contain or that the colleges give are vain without the genius for the foundry trade that is developed by hard work and everyday experience.

Dr. Moldenke agreed with Mr. Bell in the statement that training in schools does not insure success in foundry management. Take 100 young men and put them in the foundry; one may make a success. But if it takes 10 or 15 years of experience in the foundry to develop the genius for the work that is indispensable to success, how much better it would be if this can be compassed in two or

Sercombe brings down the house.

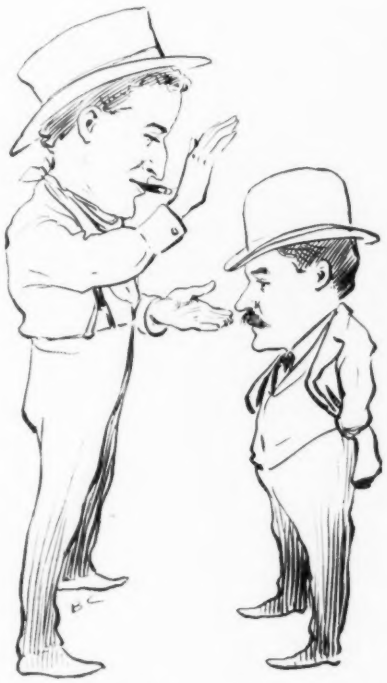
three years, with the aid of the best scientific training. The foundrymen's associations have started the movement for the bringing together of the technical and the practical in the training of young men for a foundry career; what remains is to bring the matter to

the attention of the colleges, so that a beginning may be made in a definite way. Take the practice of the foundry and the courses in metallurgy and put the two together; the result will be what we are after. Chemistry and judgment must be combined to get the results desired. Therefore it is not a chemist but a metallurigst that you want. The chemist's business is to get the mixture into the cupola and there he ends.

J. G. Sadlier, of Springfield, O., made a plea for a better recognition of the practical elements that enter into the question. Up to the present time he was inclined to believe chemistry had done as much harm as good, as applied to foundry problems. Close observation and careful attention to the business itself were the things needed to make the successful foundryman. He thought too much attention had been given to the small percentage of the metalloids contained in cast iron, rather than to the differences in iron itself that go back to the ores, and that

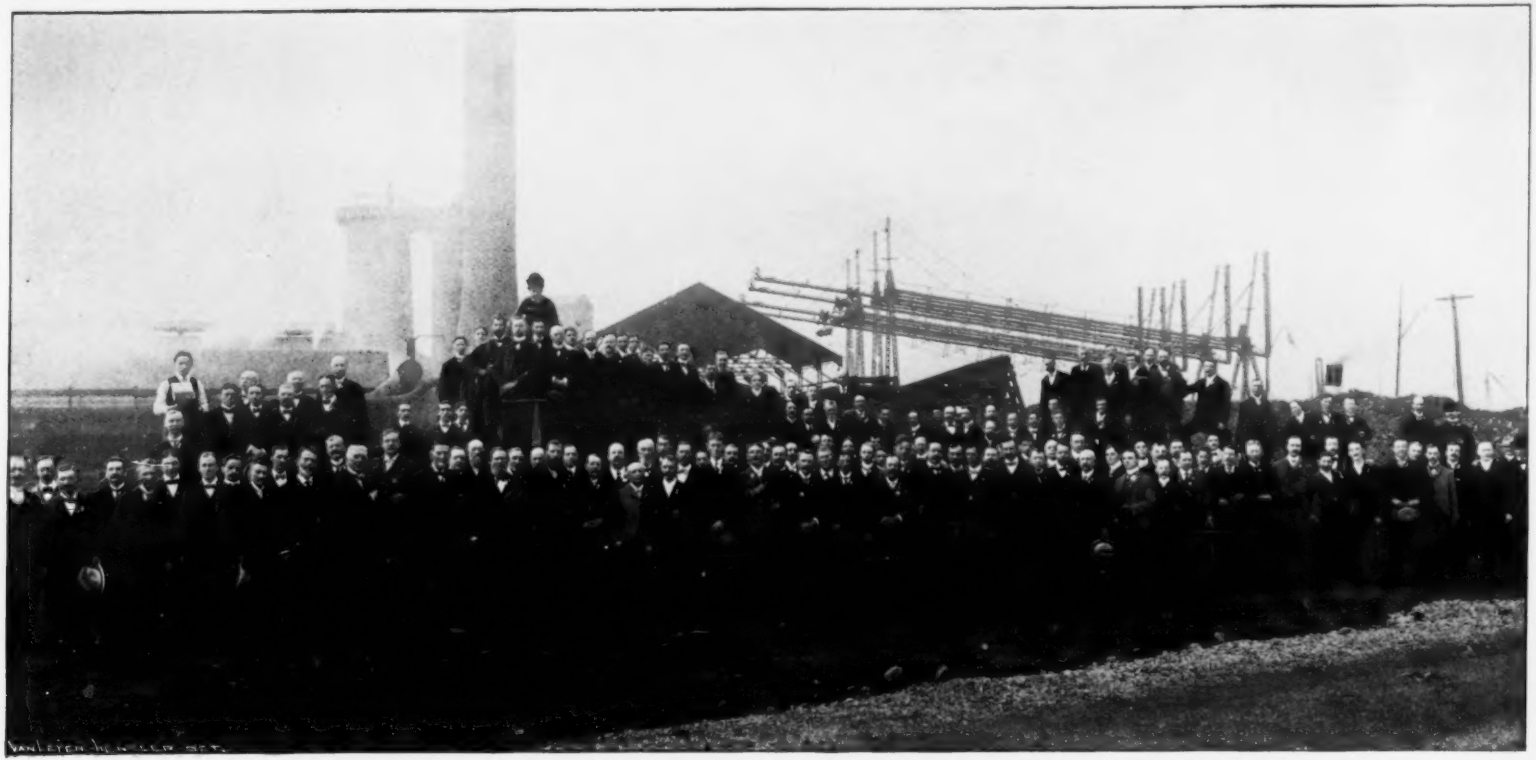
J. C. Ford feels perfectly at home.

are as pronounced as the differences between timbers—between hickory and pine. He cited various problems arising in every-day cupola practice and in other departments of foundry work, which cannot be solved in advance by anything the chemist may do. The speaker laid emphasis upon the carefully trained eye, as giving the best testimony a foundryman could have as to the conditions of the metal under varying heat treatment, etc.



Warm argument between Stirling and Cadwell.

F. B. Farnsworth, of the McLagon Foundry Co., New Haven, Ct., told of some rather discouraging experience in the effort to supply talent for the foundry management of the future. He had been instrumental in having a number of works on foundry practice added to a library in his home city, and advised apprentices to get these works and prepare for positions calling for more than ordinary molder's equipment. The effort was far from being appreciated, and there was little in the way of tangible results. While machine shop apprentices join night classes in draughting, read books and take advantage of special opportunities for getting on in their work, there is little of this spirit among foundry apprentices. The speaker had hoped that his own son would aspire to a foundry career and had trained him with that in view, giving him opportunities both in technical school and in foundry; but the young man is to-day a successful patent attorney in Washington and



The Delegates at South Chicago.

IROQUOIS FURNACE IN THE BACKGROUND.

beyond any temptation that the average foundry could offer. The trouble is, as the speaker has found, that young men who want to get ahead, are not attracted by the foundry; and the problem is yet to be solved of putting the foundry on such a footing as

S. D. Sleeth thinks there is nothing like the Westinghouse Air Brake.

would cause it to attract bright and promising young men, in the way in which they are attracted by machine shops and engineering works and by steel works and blast furnaces.

FOUNDRY TRAINING BY TECHNICAL SCHOOLS.

Following this discussion Dr. Moldenke read the memorial sent by the Pittsburg Foundrymen's Association, through its committee, consisting of Richard Moldenke, Wm. Yagle, Thos. D. West, S. M. Rogers and F. H. Zimmers. It was stated that the paper had the endorsement also of the Philadelphia Foundrymen's Association and the New England Foundrymen's Association. It is as follows:

"The undersigned, a committee appointed by the Pittsburg Foundrymen's Association, would respectfully memorialize the American Foundrymen's Association on behalf of the careful training of our coming foundry superintendents and managers for the duties they will be called upon to perform.

"When in a recent meeting of an association of foundrymen it was resolved 'that the industry had arrived at a point where there is a demand for managers properly trained in the principles of scientific and commercial founding, and that a representative body such as the American Foundrymen's Association be requested to draw the attention of institutions of learning in the country to this fact and urge hem to take the necessary steps to supply the demand,' the case was stated in a very plain manner. We are indeed drawing near to that point when so much is expected of a foreman, chemist, superintendent or manager, that he cannot hope to obtain all the necessary knowledge by the ordinary process of growing up with his work and learning to do what his predecessors were wont to do. The introduction of chilled irons, the deceptions arising from fractures of high-pressure-made pig irons, the education of the buying public in matters relating to what castings should be, the systematizing and close calculations necessary to produce successfully, and finally the very necessary utilization of irons and scrap formerly considered out of the question, have combined to give the internal foundry economics quite a different aspect when compared with the conditions prevailing a decade ago.

Moore of Joliet points with pride to the beauties of the drainage Canal.

"What will be the problem in founding we shall be called upon to overcome 20 years from now? Only a technical education in the broadest sense when combined with a thorough business training will fit the man who can profit by these to look forward into the uncertain future with equanimity. Let us survey the wonderful resources of this expanding country of ours, and note the his-

tory of each and every metallic product. We will then see that slowly but surely scientific methods introduced by trained metallurgists are improving, if not altogether replacing, the early processes. We do not now hear of losses of heavy percentages of metal in slags,

C. M. Russell rushing for the train

and where would nine-tenths of the paying properties be to-day were it not for methods based on the recovery of such minute quantities of metal that old dump heaps may be said to be profitable mines. So we will find that science has changed the metallurgy of gold, silver, copper, lead, iron, etc., so radically that we are to-day dealing with the raw metals in such enormous quantities and so uniformly excellent that a splendid series of industries has been built up to use them.

"When we realize that the production and manufacture of nearly everything metallic except cast iron is now practically in the hands of specially trained men, and that the foundry is beginning to feel this influence also, is it not wisdom to take advantage of existing knowledge and try to increase it for our benefit? We all expect our sons to follow our footsteps. When we send them to the universities to acquire the faculty of sound thinking, or to our great technical schools for a fund of knowledge unequalled in its variety and usefulness for daily life, why should they not begin to lay a good foundation for their future careers? The benefit of a sound technical training to a young man who must some day step into the active management of an industrial enterprise is incalculable. It is the object of this memorial to urge that a young man who is fitting himself for a foundry career be given an opportunity to acquire the principles underlying the successful production of foundry products before he actually enters routine work. He will thus avoid much costly experimenting when time is precious.

"How many institutions of learning attack the problem? Few of them have a corps of instructors sufficiently in touch with the foundry to meet the requirements. The most practical way would seem to be the enlargement of the regular course in metallurgy to embrace special instruction in foundry practice, supplemented by summer work and instruction in noted shops. A course in foundry practice could be given in the form of lectures by specialists in this branch of metallurgy who could also outline a series of experiments for purposes of instruction in collaboration with the regular professors where an institution possesses a small experimental foundry plant. It is quite certain that many of our institutions of learning will be glad to take up this question if so representative a body as the American Foundrymen's Association sees fit to recommend to them the establishment of courses to teach the principles of the art of founding. Our American universities have always risen to the occasion, and will not fail us in this instance. We, the undersigned, on behalf of our association, would therefore recommend the following:

Henry E. Pridmore enjoys himself.

"Resolved, That the American Foundrymen's Association would welcome a course of training in the principles and practice of founding to be established by our institutions of learning, whereby those of their students who expect to devote themselves to this line

of work may be made more valuable to the industry."

In the absence of the author, Edward B. Gilmour, Mr. West read his paper on the

CRYSTALLIZATION OF METALS.

BY EDWARD B. GILMOUR.

It is almost impossible to overrate the importance of this subject with reference to the designing of castings, as no one can design a casting intelligently without a knowledge of the laws which are brought into play in the cooling of a casting. There are few subjects in the foundry business that have attracted so little attention and had so little written upon it, and the best informaion that we are possessed of has been got by bitter experience through castings becoming defective on account of bad designs.

I will endeavor in this brief article to give some incidents which have come under my notice. Before doing so it is necessary to refer to some of the laws which govern crystallization. What is understood by that term, in a general sense, is every operation, or process, whereby any body is made to pass from a liquid or gaseous state to a solid, and assume a definable and regular form (that is in the grain). Crystallization is an accessory to slow separation. In metals this takes place in the process of cooling. All metals which are cast, when they change from a molten state into a solid, have crystals or molecules which rearrange themselves in a regular order, according to influences brought to bear upon them. The formation of these crystals depends on the constituent particles, and can only take place if the molecules possess perfect freedom of

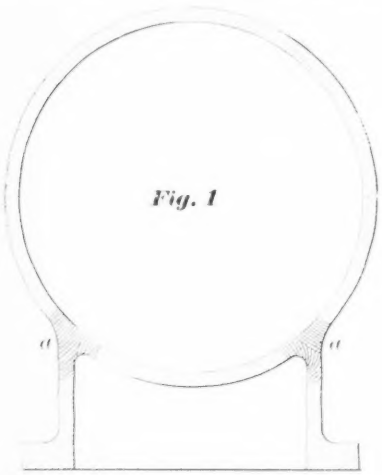


Fig. 1

motion. Generally when a body passes from a liquid or gaseous state to a solid, the crystals will take a definite shape resembling an octahedron, which is two four-sided pyramids united base to base. When the crystals are united in regular order all through the casting, without any weak planes, caused by the separation of the crystals, and which only occur on account of defective designs, a casting is at its strongest. Faulty designs have been a source of great trouble to the founder, and in a great many instances he is blamed for putting inferior iron into the castings. A regular

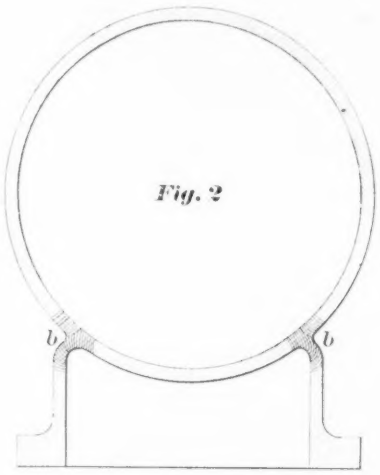


Fig. 2

formula has been used by the designer, who calculated that iron of such dimensions was strong enough to carry the load required. The practical foundryman, more especially the steel founders, are watching the designs of castings and making the necessary changes needed for the production of strong and good castings. Professor Mallet says of the formation of crystals:

"It is a law of molecular aggregation of crystalline solids that when their particles consolidate under the influence of heat in motion, their crystals arrange and group themselves with their principal axis in lines perpendicular to the cooling or heating surface of the solid, that is, in the direction of the heat wave in motion, which is the direction of least pressure with the mass. This is true whether in the case of heat passing from a previously fused solid in the act of cooling and crystallizing on consolidation, or of a solid not having a crystalline structure, but capable of assuming one upon its temperature being sufficiently raised by heat applied to its external surface, and so passing into it."

Cast iron is a crystalline material which in consolidating obeys the laws pretty perfectly, the lines of crystallization running perpendicular to the external surface or in the direction of the heat wave passing from the body in cooling, so that if there is not even thickness in construction the crystals will run towards the point of cooling first, and heavy parts being longer in cooling will be subjected to a very heavy strain, which will cause a weak plane diagonally right in the center of the heaviest part of the metal. Take, for instance, Fig. 1, which is a cross-

section of a slide-valve cylinder, right through the center of the exhaust; the point marked a a is the usual system in making the casting, with regular even fillets on the core and evenly rounded on the outside. The design looks all that could be desired at first sight, but in practice and theory it is unquestionably wrong, as the heavy body of metal at this place is longer in cooling than at each side, and the crystals are formed in

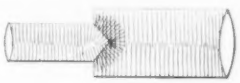


Fig. 3

opposite direction to each other, causing a weak plane where the ordinary observer would expect it to be strongest, when in reality it is the weakest part of the cylinder. With a number of castings of this design we had a troublesome experience. After the engines had been delivered and were running, in a great many instances the cylinders cracked at the point shown, and the first one that gave way caused a legal controversy on account of the quality of the metal; but when, with the repeated occurrences of these breakages, the builders' attention was drawn to the construction, the result being a change in design to Fig. 2, b b—which is

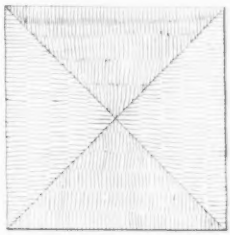


Fig. 5

in accordance to the laws of crystallization—and resulted in neutralizing all the hard epithets which are usually showered upon each other under such circumstances.

The difference in design and the change in the order of crystallization is readily seen in this illustration.

Fig. 3, c c, shows an arrangement of crystals which causes a weak plane to run into the heavy part. Fig. 4 is an example of crystal arrangement which is very definite, and is of the strongest nature. Fig. 5 is a flat plate section with crystals following a regular order radiating from the inside, with the exception of a diagonal weak plane—which usually causes the outer edges to raise up and make a twisted plate. In order to obviate this trouble it has been found expedient to cover the whole surface of the casting with about 3 or 4 inches of sand, afterwards take a rammer and strip the sand upon the diagonal lines, which will cause

Fig. 4

the casting to cool quicker at this point and change the crystals into a regular form throughout the casting. In no case should flat plates ever be cast with hard iron, for the reason that in hard iron the crystals are more pronounced than in soft iron. Fig. 6 is a round bar which shows the crystals all radiating from the center in regular order. Fig. 8 shows an arangement of crystals in a set of building plates, which were made to strengthen the building of cylinder molds. We had a number of these castings to make, and our intention was to use the same plates for each mold, but they always split diagonally at the corner after the cylinder was cast.

Fig. 6

I, therefore, made a change in construction, which completely re-arranged the crystals, as is demonstrated in Fig. 7, and gave the desired result of saving them every time. It will be apparent from the illustrations that any one having charge in the designing of castings should give particular attention to such points as are set forth, and avoid all unequal thicknesses or sharp corners. Although many castings may be made which will not show any particular defects in a marked degree, because if they are exposed to great

heat the crystals will re-arrange themselves, as has already been demonstrated, from the entering and returning of the heat waves, and the greater the heat the more easily

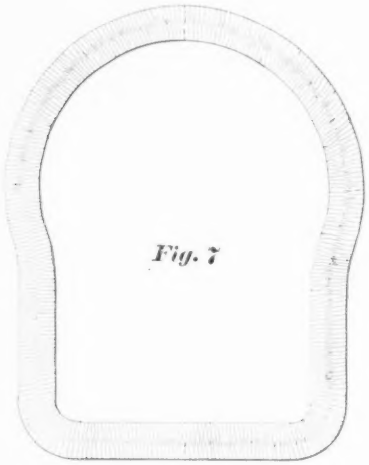


Fig. 7

will the above laws be obeyed. Consequently, if the designer is familiar therewith, the founder will be saved much money and time —also a great deal of anxiety and trouble. The molder before pouring his work should be cautioned to look after his iron and see that it is of the required temperature to suit the work; for the heavier the piece is the

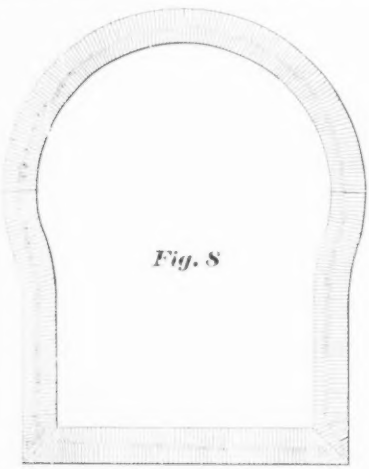


Fig. 8

cooler should it be poured, as the development of crystals depend upon the regularity of the cooling of the casting, and dull iron always makes stronger castings because the crystals are better defined. However, this does not always make clean castings—so that after all, the molder has got to use discretion in order to produce the best results.

DISCUSSION.

Several of those present were inclined to differ with Mr. Gilmour's conclusion that dull iron made the stronger casting, and cited individual experiences to prove that almost universally a casting poured with hot metal will be the strongest.

The Secretary read the following paper by R. P. Cunningham, on

THE MIXING AND MELTING OF IRON FOR HYDRAULIC WORK.

BY R. P. CUNNINGHAM.

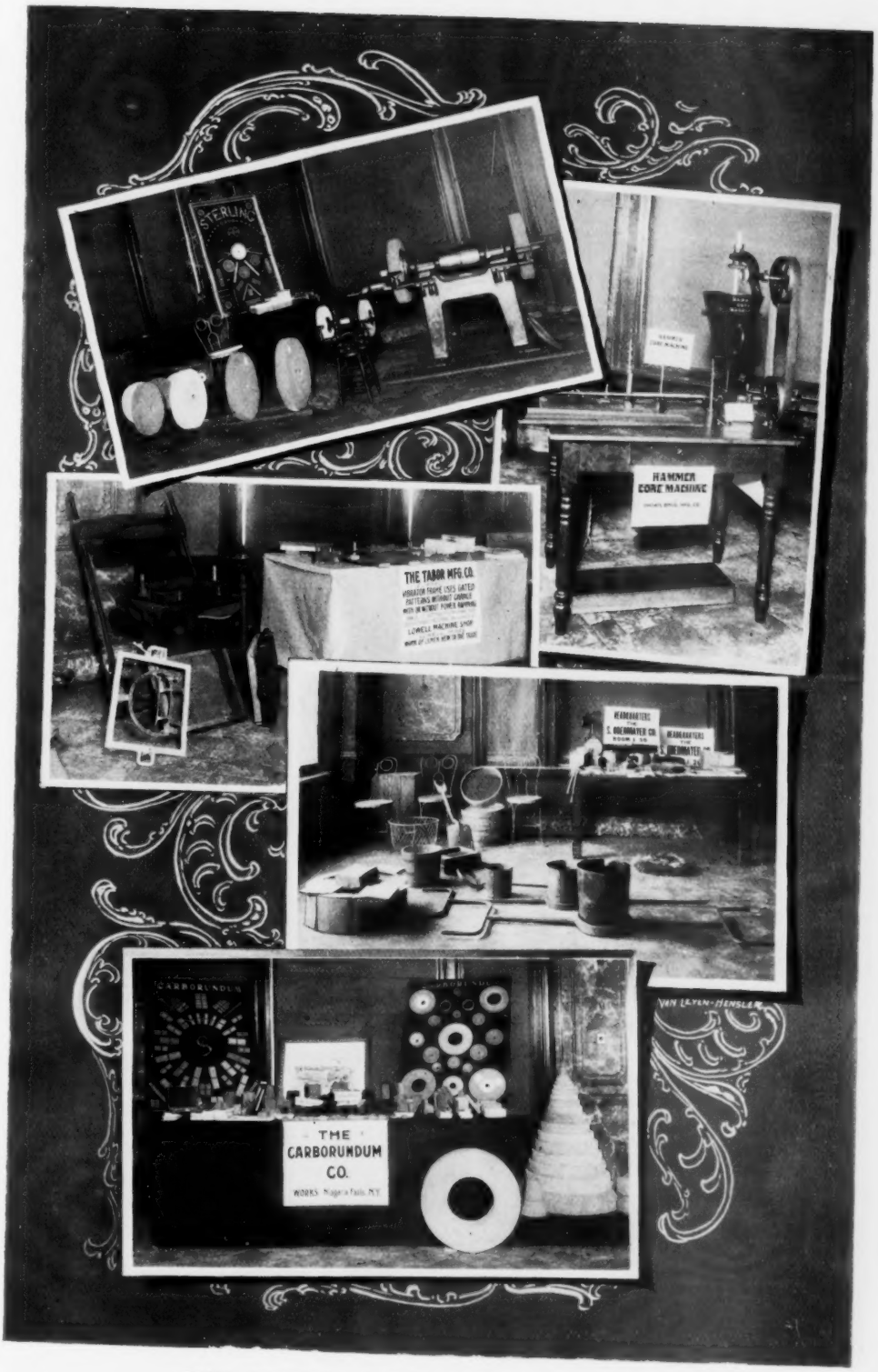
The mixing of iron for castings used on hydraulic work, or any casting that is required to stand a great pressure, has never received the attention it should have by the average foundryman.

It is a common occurrence in shops where hydraulic work is cast to have trouble with castings leaking. What I mean by that is, when the machine is put on the test it will not stand the pressure, and water will come through the casting.

This is very aggravating, besides being very expensive, as the machine work is sometimes four times the cost of the casting; and to have the casting and the labor charged back to the foundry is something that the foreman does not relish, and very often he is not to blame for the defective castings, as he had done everything he could, and the only blame that could be laid on him is that he should know his iron. If he had, the result would have been different. As it was, he tried to do the best he could with what he had, and his failure should be divided with those who compelled him to use iron entirely unfit for the work required.

In the best managed foundries the metal sometimes goes astray, and the unpleasant experiences which soon follow are decidedly painful. Often hundreds of dollars are lost; the foreman is called into the office and is shown letters from the firm's best customers complaining about the castings; he is at a loss to understand the cause; his reputation is at stake. Upon investigation he is more confused than ever. Everything was conducted as usual; every rule he laid down had been followed; and yet these breaks occur, and are difficult of explanation. Every one admits that something is wrong, but how to locate the trouble? The answer is easy. Chemistry is your only relief, with its certainty of result.

If you should want a nice piece of woodwork done, would you insist on using an inferior wood, or would you allow the woodworker to select the wood best suited for the work? If you wanted a special tool made, would you insist on your blacksmith using a cheap steel, or would you allow him the privilege of using his own judgment, and select the steel best adapted for this particular piece of work? The foundryman should know his iron as the woodworker knows his wood or the blacksmith knows his steel. He should be able to tell you at once the kind of iron required for any kind of



SOME EXHIBITS AT THE CHICAGO CONVENTION.

work. This information can be easily obtained by an analysis of your irons.

We will take the six principal elements found in iron, namely: Silicon, Sulphur, Phosphorus, Manganese, Combined Carbon, and Graphitic Carbon.

Henry Penton welcomes the president of the R. F. R. to the plant of the Chicago Shipoulding Co.

Let us see what effect these different elements found in pig iron will have upon the castings.

Beginning with Carbon, it has more influence on the physical characteristics of cast iron than any other; and within certain limits the influence of the various other elements are exerted not on the iron itself, but on the Carbon.

According to Fresenius, there are four forms of carbon present in cast iron, but only two are well known, i. e., graphitic carbon and combined carbon. In the total carbons in any one iron there is not a great variation; but the results of the relative amounts of the two on the strength and appearance of the iron are enormous. The higher the carbon the weaker the iron. Graphitic carbon renders iron soft; but, owing to its disturbing elements, is low in tensile strength. Its disturbing continuity arises from the fact that it is simply an inter-molecular and not a true chemical combination, as is combined carbon. Iron high in combined carbon will have greater strength. The remelting will change graphitic carbon into combined carbon, and increase the strength and density of the iron.

Silicon. This element in iron is better known than any other. Its effect on foundry iron is that of a softener, i. e., it turns carbon into the graphitic state, owing to its great power over carbon, from which it is impossible to separate it. It is hard to tell just what its influence is on iron; but it is considered that anything above two per cent weakens the iron.

Sulphur turns graphitic carbon into the combined state, and makes the iron closer grained; but, in a casting with uneven thickness, is liable to crack. This can be overcome by melting the iron hotter, as the hotter the iron the lower the sulphur and graphitic carbon. A small amount of sulphur is not objectionable in iron used in casting hydraulic work, as an iron to show great strength and density should contain from 0.03 to 0.05 per cent. It should not be forgotten that coke contains a large amount of sulphur, and iron readily takes it up—and often the iron is condemned when the fault is with the coke. Therefore, one can readily see it is as necessary to know the analysis of your coke as your iron. It is a well-known fact that some of our best coke contains 0.50 per cent of sulphur, and some even higher. For this reason you should have the sulphur as low as possible in the iron.

Phosphorous. This element has a tendency to convert graphitic carbon into the combined state, but owing to the greater effects of silicon and sulphur, its influence is not so marked. On account of fluidity and a tendency to overcome shrinkage it is valuable in iron used in hydraulic work, as in most cases with this class of work there is a large amount of cores and you are apt

J. C. Pope is interested in machinery.

to have cold shuts unless the iron is very fluid. Another fact in this work is that the thickness is very uneven and liable to be porous unless the iron is fairly high in phosphorus, say from 0.50 to 0.80 per cent; but

on light work it may run as high as 1 per cent.

Manganese, like sulphur, has a tendency to make iron harder and denser; but as most irons have very little of this element in their composition, not much attention has been paid to it—not as much as should be—for, owing to its chemical attraction for sulphur, it serves to carry off much of this element which would otherwise combine with the iron, the sulphate passing off in slag. For hydraulic work, iron containing from 0.40 to 0.60 per cent can be used to an advantage.

We will take the castings used in hydraulic work. They must be sound, close-grained and free from shrinkage. Only those that have had experience in this class of work know how difficult it is to accomplish. The exact chemical composition required in iron to produce the above castings should be determined and lived up to closely. It is only necessary to analyze your iron for the four principal elements, for it is a well-known fact that iron high in silicon is low in sulphur; and when silicon is low, manganese is low and sulphur is high.

In foundry irons you must watch the silicon, phosphorus and manganese in order to obtain satisfactory results.

In summing up, your mixture should contain from 1.25 to 1.50 per cent of silicon;

Chas. L. Miner watches the market closely.

from 0.60 to 0.80 phosphorus; from 0.40 to 0.60 manganese, and sulphur as low as possible.

If you will take that for your standard, melt your iron hot, you will see a decided improvement in the quality of your castings.

There is another point that must not be overlooked. In foundries using a large amount of scrap, say from 25 to 40 per cent,

J. B. Green and E. J. Woodison begin to think of the hereafter.

there is no fixed rule that you can adhere to. I always keep the scrap from the machine shop and sprews separate, and use these in the first of the melt, pouring my best work from this iron. Take this in addition to what No. 1 scrap I can pick out of the outside scrap pile, and by letting the other go into the common iron, which I use only in work that is not required to stand a pressure and has little or no machine work on it. In doing this way it takes a little extra labor, but is more than offset by the quality of your castings.

The care and management of the cupola is another point which should receive its share of attention. The mortar used in repairing the cupola should be mixed with great care. If the mortar should run in the cupola, the first iron would come hard and dirty. For this reason you cannot be too careful with your mortar.

The different brands of iron and scrap should be thoroughly mixed in the cupola, and not thrown in at random. Each charge of coke should be put in even, and the whole kept as level as possible. The iron should be drawn into a large ladle, and from there into smaller ones. By doing this way your iron is thoroughly mixed, and good results obtained.

I am no great advocate of seeing how little coke I can use in melting iron, for I

claim more castings are lost by dull iron than in any other way. An extra fifty pounds of coke on a charge will sometimes save hundreds of pounds of castings, especially in work that is thin in places and has a large amount of cores.

R. E. Doak names a low price.

I have found by following these rules that I have increased the quality of my castings, and the per cent of good castings to the iron melted.

In conclusion I will say that there may be others that have just as good, and perhaps better, ideas than I have advanced in this paper, and to those I will say, let us hear from you on this subject. I am open to criticisms, as it is only in this way that we get each others' ideas. By doing so we raise the standard of foundry work.

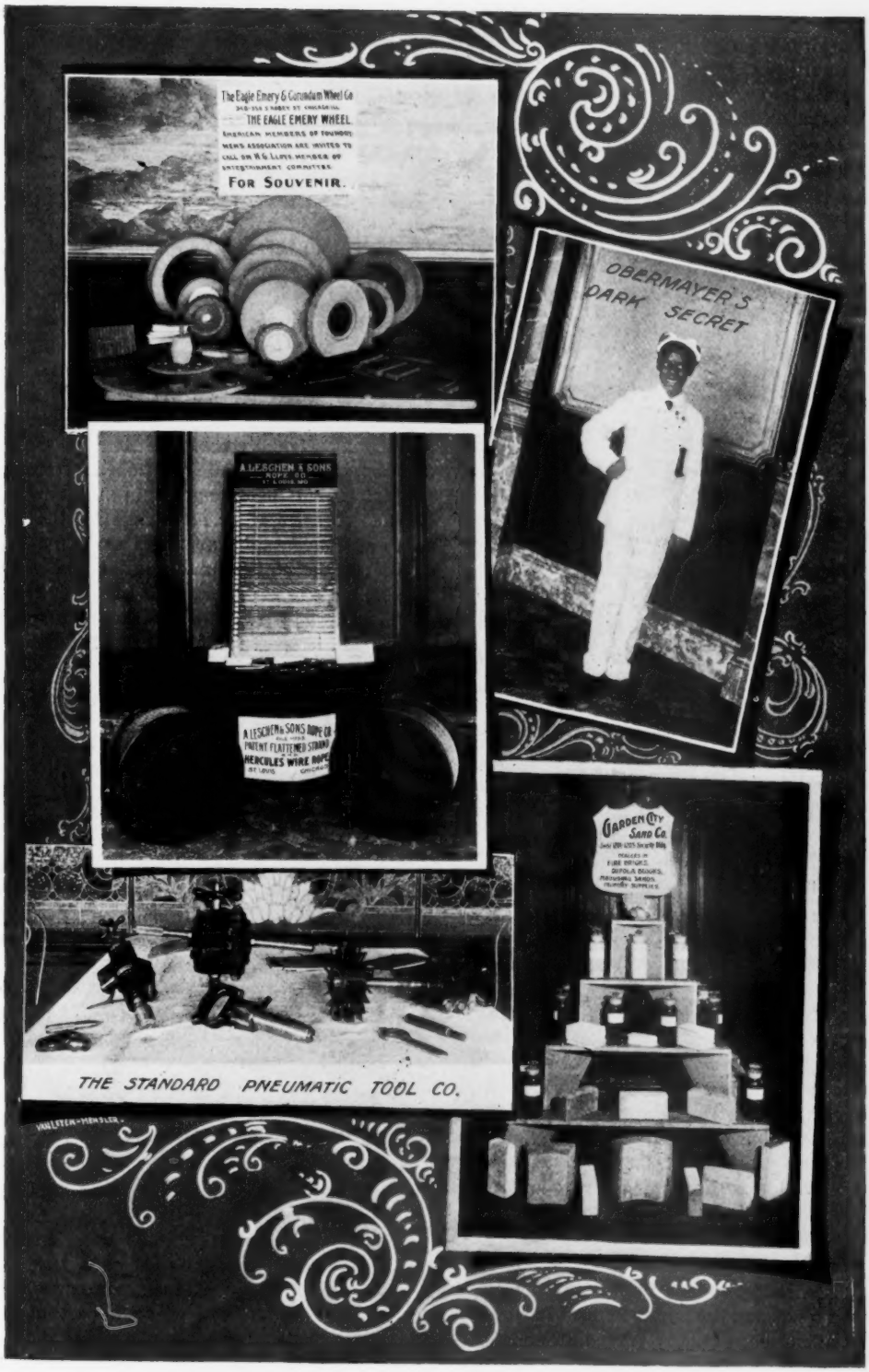
THE TRIP TO SOUTH CHICAGO.

What will probably linger the longest in the memory of those in attendance was the visit paid to the works of the Illinois Steel Co., at South Chicago. The steamer Soo City had been chartered for the occasion and well provisioned against any hunger or thirst likely to arise. Several vessels were laying at the docks and the method in vogue for unloading and storing ore were closely examined and excited much admiration. It was a complete revelation to many as to what is possible where materials are handled in enormous quantities.

The rail mill was a department of more than usual interest, the rapidity and exactness of movements being favorably commented upon. The huge converters also came in for a share of the visitors' attention, as did also the blast furnaces and casting houses.

The trip up the Calumet river was continued and the steamer soon reached the furnace of the Iroquois Iron Co., a Rogers, Brown & Co. interest. Time enough was taken here to secure a group photograph. The foundations of the new furnace are rising and it is expected it will be ready by the time the first ore for 1901 is brought down. Ore is unloaded direct into the yard by a number of Brown rigs. During the visit at the Iroquois furnaces each member of the party received a folder and cigar holder containing cigars, with the compliments of the Iroquois Iron Co. The folder gave analyses of Nos. 1, 2 and 3 Iroquois, and of Sterling Scotch, Peerless and mill iron. The No. 1 contains 2.25 to 2.50 silicon, .30 to .40 phosphorus, .40 to .60 manganese and .02 to .05 sulphur. The No. 2 has 1.75 to 2.25 silicon, with the other elements the same as in No. 1. Appended to the analyses is this statement: "To meet the growing demand for a reliable graded iron we analyze and grade according to the foregoing table. After a

Al Cordingly, the only lady's man in the bunch, covers himself with glory.


The Eagle Emery & Corundum Wheel Co
THE EAGLE EMERY WHEEL.
FOR SOUVENIR.
OBERMAYER'S DARK SECRET
A. LESCHEN & SONS ROPE CO.
PATENT FLATTENED STRAND
HERCULES WIRE ROPE
THE STANDARD PNEUMATIC TOOL CO.
GARDEN CITY SAND CO.

SOME EXHIBITS AT THE CHICAGO CONVENTION.

year's experience we can positively state that iron graded by analysis regardless of fracture is a success. Each cast is analyzed from samples of the molten iron. No two casts are mixed in piling." The present annual capacity of the Iroquois furnace is 80,000 tons. When the furnace now building is completed this will be increased to 180,000 tons.

Leaving the Iroquois furnace the Soo City headed for the large plant of the Chicago Shipbuilding Company, where Superintendent Henry Penton took the visitors under his guidance. Several very large lake steamers are in the course of construction here. No foundry is operated by this company, but the lack of this department to the works was more than made up for by the large, interesting machine shop. A noticeable feature of this is the great amount of daylight which is furnished through numberless skylights.

M. S. Jones knows a thing or two about rope driving machinery.

WEDNESDAY EVENING.

Theater tickets had been distributed to the visitors during the trip to South Chicago. The word had been quietly passed around for the delegates to rendezvous at a certain hall on North Clark street after returning from the theaters, where it was rumored the famous Plumbago Club would come to order. A special report of this meeting will appear in a following issue.

THURSDAY MORNING.

The meeting was called to order by President Seaman at 10:30 a. m. The president asked for an expression of opinion as to the next place of holding the annual convention, for the guidance of the executive committee, and stated that any invitations from cities might be presented at that time. None were forthcoming, but Mr. Bell said that Boston, Buffalo and Cleveland were all candidates for the honor of entertaining the next convention. Dr. Moldenke suggested that it might be a good idea to hold the next convention at some resort like Atlantic City or Lookout Mountain. He also expressed the opinion that the engagements might well be made so as to allow more time for the reading and discussion of papers than had been the rule heretofore, and that the entertainment given the guests should be of a less elaborate nature. The question of place for the next convention was left in the hands of the executive committee.

Mr. Bell suggested that as the trade and technical journals cover all the matter now published in the Journal of the association, it would be advisable to drop the Journal. Stanley G. Flagg, Jr., opposed this, saying that the Journal contained the papers and discussion and other material in much more convenient form than the trade papers could furnish it, and that the Journal should be improved rather than dropped.

Mr. Seaman told of the arrangements now in force with most of the local associations, whereby the American Foundrymen's Association furnishes to the former all the papers prepared by their members, printed in pamphlet form for distribution to the membership of the local associations. The latter then hold their meetings simultaneously, after which the papers are published in the Journal, followed by the discussions at all of the local meetings. He stated that plans had been formed for further bettering the service, and for making closer relations between the local and the American associations, and that the Journal is to be an important part of these plans. Dr. Moldenke suggested that the Journal might be published in unbound form, from time to time, at irregular inter-

vals, as the secretary had material of any kind to furnish the members, each separate part so made as to be bound in one volume at the end of the year, thus forming complete transactions for the year of the association. This is as several other of the technical societies arrange the matter.

It was moved and seconded that a committee of five be appointed by the president to revise the by-laws and constitution of the association. After discussion this was adopted. The chair appointed on this committee Messrs. Brown, Keep, Moldenke, Bell and Jones.

C. J. Wolff, of the committee on nominations, announced the following: President, W. A. Jones, W. A. Jones Foundry & Machine Co., Chicago.

Secretary, Dr. R. G. G. Moldenke, Pennsylvania Malleable Co., Pittsburg.

Treasurer, Howard Evans, J. W. Paxson Co., Philadelphia, Pa.

Vice-presidents:—New England States, Geo. B. Buckingham, Arcade Malleable Iron & Steel Co., Worcester, Mass.; Middle States, Wm. Yagle, Wm. Yagle & Co., Pittsburg; Southern States, J. P. Golden, Golden Foundry & Machine Co., Columbus, Ga.; Central Western States, John A. Penton, Detroit, Mich.; Northwestern States, Wm. Ferguson, Wm. Ferguson Foundry Co., Chicago; Southwestern States, W. S. Mosher, Dallas, Tex.; Pacific States, R. Chartrey, San Francisco, Cal.; Canada, T. J. Best, Warden King & Son, Montreal.

On motion the secretary was instructed to cast a ballot for each of the nominees, and they were declared elected in due form.

Retiring President Seaman thanked the association for the honor it had given him, and introduced the new president, W. A. Jones, who made appropriate recognition of the association's bestowal and stated that it would be his aim to advance the interests of the American Foundrymen's Association in every way.

A vote of thanks was then given the retiring officers for their efficient services in the past year. Following the precedent of recent years, Dr. Moldenke moved that J. S. Seaman be made an honorary member of the association. Adopted.

A vote of thanks was tendered the Chicago foundrymen and the local committee of arrangements for the very elaborate entertainment given the association at this convention.

A vote of thanks was tendered the Illinois Steel Co., the Iroquois Iron Co., and the Chicago Shipbuilding Co for the privileges given the members of the association at the works of these companies.

The secretary mentioned the death of former Vice-President C. A. Bauer, of Springfield, and paid a glowing tribute to his memory. On motion a resolution was passed providing for a committee of five, which was made to consist of the three ex-presidents, the president and the ex-secretary, to draft suitable resolutions in this connection.

The following papers were then read.

WHAT ARE IMPROVEMENTS?

BY P. R. RAMP.

Many articles have been published referring to improvements in the foundry, our mechanical papers are well supplied with illustrations and descriptions of improved materials and appliances. With so much of the product of man's genius at our command it seems incredible that we have not reached perfection.

When we look around us and see the many devices invented to save labor and time, we wonder what would be an improvement in our shop, because we must realize that what would be an improvement in one shop would be a failure in another, that is to say, it would not be a paying investment to erect a twenty-five-ton traveling crane in a shop making two-ton castings.

The first improveemnt required is a practical mechanic as manager, one who is capable of making improvements and seeing that proper results are obtained. For a man not familiar with the trade in detail is often led to believe that the molding machine he has recently purchased is not a success, and if it is allowed to stand idle so much money is thrown away. On the other hand, the practical man takes a hold of the same machine, if it can be operated successfully and his men do not succeed at it, he will enlighten them.

This instance does not only apply to molding machines, but any improvement put into a foundry. A man like this would not depend upon the ability of the men under him, but is governed by his mechanical experience, proving himself a master of his business; he is competent to develop, or in other words, make men by giving them practical instructions in the trade.

Considerable improvement can be made in the method of making and using the flasks in many shops. The practice of compelling molders to use old flasks, with the joints badly burnt, in order to save lumber, is not a principle of economy; one who does so generally has to pay for it. A few hundred feet of lumber will often save many thou-

sands of pounds of castings from the scrap heap, that is, from the time a job is put in the sand until the order is filled, the loss in bad castings will often be fifty per cent greater than when the molder has a good flask. A good flask and a pattern properly constructed will not only make it impossible for the molder to blame the flask for any carelessness on his part, but will make it possible for one with less experience or a cheaper man to do the same work. So we see a good flask is as essential in molding as a good pattern. Strong, well made flasks cheapen the product by reducing the loss in bad castings and increasing the output often to a very gratifying extent.

It is poor policy to patch up a flask. If you have an order for ten castings and the profit on the first one will pay for the material to build a new one, build it. You may lose one-tenth of the profit, but you are liable to lose more than a tenth while using the patched up affair.

Temporary makeshifts are dangerous and often expensive. In a shop where there are many standard jobs and the work is heavy, as in railroad machinery, etc., my experience has shown it is much cheaper to make iron flasks.

Then the shop should be equipped with a good trolley system, a trolley track over each floor. The flasks that are too heavy to lift by hand should be handled with an air hoist suspended from the trolley. Such flasks must have trunnions cast on them, so that with the aid of a bail the molder will be relieved from all heavy lifts.

Iron flasks cannot burn out at the joints. When they become obsolete they may be broken up and remelted, whereas in case of wooden flasks they are of no further value.

Considerable time might be occupied in discussion of this subject, but in summary will say, strong substantial and practical foundry equipment, in charge of one thoroughly versed in the same, cannot fail to come under the head of improvements.

THE REAL FUEL RATIO.

BY L. C. JEWETT.

There has been a great amount of discussion in the past and is at the present time as to the amount of iron which should be melted with a ton of coke. Cupola builders have been in the habit of setting forth seductive claims as to the advantages in this respect for their cupolas. It is not uncommon to find heats mentioned where eleven to one has been melted, and this will go as high as thirteen to one in the claims for some makes of cupolas. To use more than this amount of coke in melting iron is by these people made to look akin to robbery. Proprietors, particularly those who are ignorant of practical foundry management, have been incessant in their demands upon their foundry foremen to reduce the item of fuel, regardless of any conditions under which the shop might be working, and whether the castings made are heavy or light.

To illustrate what takes place in an effort to reduce the fuel ratio, I have appended a conversation (an actual occurrence) between the superintendent and foreman of a prominent foundry:

Superintendent: Can you give any reason why we cannot melt iron as cheap as they do over at our neighbor's foundry? They say they are melting from ten to ten and a half pounds of iron to a pound of coke right along, while your reports show that about eight and a half of iron is as high as you get. Your blast is just as the cupola builder stated it should be. Now, if you haven't a good melter, fire him and get another one. If you haven't wind enough, we will speed the engine up or change the pulleys. Do not overlook the fact that we must run our foundry as economically as others in order to prosper.

Foreman: Considerable can be said as to what is economical in the management of a foundry or cupola. With all regard for the interests of this company, and due respect for the managers of our neighbor's foundry, I wish to say that I have always believed the real economy in melting iron lay in having it hot enough. If it comes too hot to pour at once it can easily be chilled, but if too dull, it is impossible to increase its temperature. When iron is melted hot, the various grades mix better, it is sure to run the work all around, it gives more time for the molders to pour their work understandingly, there is less waste, and the ladles are left in better condition. A foundry foreman is ever on the alert to know the conditions of the melted iron from the first to the last, or at least he should be. He is also in a position to know from the working of the cupola whether there is too little or too much fuel used at any stage of the heat. Over at our neighbor's foundry, there is a far different class of work from what is made here. Eighty per cent of their metal is handled with crane ladles, while here we have conditions exactly opposite. When iron must be poured from a small ladle, and several molds from the same ladle, it becomes absolutely necessary to have the iron hotter than if the metal could be handled in large quantities, since its temperature falls very rapidly in small bodies, and brings the molder still nearer the ragged edge of uncertainty. However, I am not egotistical or prejudiced in the least; I have no desire to use anything with extravagance, and if we can get iron sufficiently fluid with less coke, without wasting more at the bung than is saved at the spigot, you will never know a more appreciative pupil than your present foreman.

The upshot of this interview was that an arrangement was made to try our neighbor's formula for melting iron in our cupola. At the first trial, the first part of the heat came down quite hot, but when half through, the

iron became duller and the ladles began to bung up, the molds were not all poured off and all small ladles had to be relined the next morning, beside one crane ladle. After viewing the results of the experiment, it was decided to speed up the blower the next day, and also to change the amount of fuel and stock so that the charges would be lighter. On the second trial, the cupola melted somewhat more even, but the ladles were all bunged up before the heat was ended, and the molders were doing that reckless pouring so noticeable in all shops where dull iron is the rule, and where it is a common occurence to see a molder pour a sprue hole, even when he knows that there it not the least chance of the iron running half of the casting.

The third heat was a repetition of the second, with a frantic rush by the molders to get the iron out of the ladles before they should get bunged up. The result of these three heats was any number of defective castings. Some were strained, others were cold-shut and many were poured short. Extra help had to be put on to prepare ladles and take care of the increased work around the cupola.

On the fourth morning, the foreman sent for the superintendent, to whom he said: "I am beginning to learn how to melt ten to one, and I want to know whether you want to continue in this manner."

Superintendent: What is your opinion of the scheme?

Foreman: Just the same as before we started experimenting, that iron can be melted ten to one is beyond dispute, but it makes all the difference in the world what kind of work it is melted for and how rapidly it can be handled after leaving the cupola.

I have arranged a table of the different fuel ratios based on heats of twenty tons a day and coke at four dollars per ton:

Coke.	Iron.	Cost of Fuel for 20 tons.	Cost of Fuel per ton of iron melted.
1	to 6	$13.33 1-3	$ .66 2-3
1	to 7	11.43	.57 1-4
1	to 8	10.00	.50
1	to 9	8.99	.44 1-2
1	to 10	8.00	.40
1	to 11	7.27	.36 2-3
1	to 12	6.66 2-3	.33 1-3

We have run in this improved way three days, melting more than sixty tons of iron on the ten to one formula, and we have secured theoretically above any previous average a saving of $2.00 per day in fuel. Against this we have to charge the outlay for extra help to daub ladles, the material (mud and fuel) used for same, the castings that have been lost, and what is worse, the irritating effect produced upon the workmen. It may not be known to you, but it is a fact nevertheless, which any molder will tell you, that a ladle, however slightly bunged up with chilled iron seems much heavier to handle than the same ladle clean and full of nice fluid iron. Considering all these things, I ask you, "Shall we continue to save some two dollars per day on the charging stage and let six or eight go to waste on the floors?"

FOUNDRY FLASKS.

BY ELI H. PEARCE.

A good flask is the molder's friend and the proprietors profit. I believe that more castings are lost through poor flasks than any other appliance in the foundry; more so is this true in the jobbing than in the one devoted to specialties.

Going into a jobbing foundry, we will find good cranes, cupolas, ladles, etc., while a visit to the flask yard is likely to set our thoughts agoing.

Here we will find flasks six feet square made of 1½-inch lumber, with bars of 1-inch stuff. Many of the latter will be burned or cut out, thereby causing them to be weaker than they were originally.

The corners of the flasks will be simply nailed together and not re-enforced with through bolts or corner pieces as they ought to be.

The pins will be of a weak, shaky nature, secured in place with screws in such a manner that they soon become loose and allow the flask to shift at the joint, causing an unsightly seam to appear on the casting if any part of the pattern projects into the cope; and in case of an irregular joint increasing the chances for a crush.

In many places we will find a pin that is an abomination, and should not be called by such a respectable name as "pin." I refer to the taper "mistit" made of wood. Some foundries are so short sighted as to think that they cannot afford to make an iron pin —still, one lost casting will pay for a great number.

While on the subject of flasks I must beg you to allow me to transgress a little and call attention to the bottom boards, which in many cases are made too light in the first place, and later, in their burned-out condition, are worse than useless, as they allow swells on the casting, and sometimes bring about a run-out. Yet we wonder that other craftsmen look on us with more or less derision.

The master mechanic in the machine shop desires a new machine made for some special purpose. He is careful to calculate the strain that each part of the machine must stand. He and the draftsman go over all the drawings and check up any errors that may exist.

How different have we conducted the foundry part of the work on that machine. When we received the patterns we did not stop to calculate the strain that would come on the bottom board when the flask was poured, nor did we very likely determine the strain exercised upon the cope.

Here is what we did do. We went to the carpenter and said: Make a flask 4 ft. by 6 ft. inside measure, cope 6 inches deep, drag 12 inches deep; make the side of 2x6 for the

cope, and 2x12 for the drag; use 1 inch stuff for the cross bars.

Such a flask will do the work all right when new, provided the drag is secured with good cross-clamps to prevent the casting from swelling in the center; but after it has been used several times, then the trouble begins.

The writer does not claim to be any exception to the rule, and must confess that the rule of thumb holds a prominent place in his calculations; but he tries to use it in such a manner as to generally land on the safe side.

During my foundry life I have learned by bitter experience that every time a flask is used it becomes weaker through burning and the rough usage it receives in shaking out. Being generally stored outside where the weather can play havoc with it causes it to grow weaker with age.

When ordering a new flask I always consider that it is to be used more than once, and make provisions for this by having the lumber heavy enough to more than stand the strain even if no bolts were used. Besides, I am careful to have good, heavy bolts in the cope, and also in the drag when the shape of the pattern does not interfere.

Being situated where cypress lumber is $18.00 per thousand feet, a little extra lumber in a flask is a small item with us. The following tables show what I find the proper size to use; and while some may think them heavy, I am inclined to believe that this kind of construction pays in the long run.

The bars should not be further apart than 8 inches from center to center. These tables are based on the supposition that copes and drags are 6 inches deep, and for every additional 6 inches of depth of either cope or drag add 25 per cent to the thickness given for that size flask in the table.

Square Flasks.	Sides.	Bars.
24-in. and under	1½ in.	1 in.
24-in. to 36-in.	2 in.	1¼ in.
36-in. to 48-in.	2½ in.	1½ in.
48-in. to 60-in.	3 in.	1½ in.
Rectangular Flasks.	**Sides.**	**Bars.**
18-in. x 48-in.	2 in.	1 in.
18-in. x 60-in.	2 in.	1 in.
18-in. x 72-in.	2½ in.	1 in.
18-in. x 84-in.	2½ in.	1 in.
24-in. x 48-in.	2 in.	1¼ in.
24-in. x 60-in.	2 in.	1¼ in.
24-in. x 72-in.	2½ in.	1¼ in.
24-in. x 84-in.	2½ in.	1¼ in.
36-in. x 48-in.	2½ in.	1½ in.
36-in. x 60-in.	2½ in.	1½ in.
36-in. x 72-in.	2½ in.	1½ in.
36-in. x 84-in.	2½ in.	1½ in.
48-in. x 48-in.	3 in.	1½ in.
48-in. x 60-in.	3 in.	1½ in.
48-in. x 72-in.	3 in.	1½ in.
48-in. x 84-in.	3 in.	1½ in.

The square flasks, sizes 24-in. to 36-in., should have one row of short cross-bars running through the center of flask, connecting the long bars that extend from side to side. Sizes 36-in. to 48-in. should have at least one cast-iron bar, preferably two, and should also have one row of short cross-bars. Sizes 48-in. to 60-in. should have at least two iron bars, and two rows of short cross-bars.

In the rectangular flasks we need no connecting bars until they become 36-in. wide; then they should have a row of short cross-bars running lengthwise of the flask. Those over 60-in. long should have one cast bar crosswise in the center. Flasks 48-in. wide should have two rows of short cross-bars and two cast bars equal distances apart, and from the ends of flask.

All copes should have a ½-in. bolt running from side to side at each end, and where the cope is longer than 3 feet it should also have a bolt in the center. When copes are more than six feet long, the bolts should be spaced about every 2 feet apart, and all bolts should have a large washer on each end.

Drags should also have bolts at each end; but as conditions often prevent their use in the center, I would advise the use of a stout, long-nosed clamp placed crosswise of drag every 18 in. or 24 in., and securely wedged.

At the risk of being taken to task on the subject, I will say that all guide pins should extend up the side of flask at least 2 inches, and be bolted on with bolts not smaller than 5-16 inch in diameter.

I am well aware that many foundries never think of fastening pins on with anything but screws; but these will become loose in time and, being rusty, it is impossible to get them to take a fresh hold, while with a bolt, two wrenches will either tighten the pin or break the bolt.

FOUNDRY MANAGEMENT.

BY JAS. A. MURPHY.

Few men run foundries for the good of their health; they, like every other branch of industrial enterprise, are run to make money—not for the pig iron and coke dealers, foundry supply merchants, or the help that is necessary to conduct them (though in many cases the lion's share of the profits go to the above mentioned), but for the owner's own pecuniary profit. Upon this theory all start out with more or less of a flourish to do business, and our success depends upon our plant and its location, management, material and tools.

Granting that the location is all right, the architectural design of a shop has much more to do with its efficiency than is generally supposed. Light is the all-important thing that is wanted on the foundry floor, just as much as mental light is wanted on foundry subjects by a great many. Sand is a bad conductor of light, and everyone knows it. Then why is it so many foundries are almost dark. You would not expect your typewriters to produce a letter free from typographical errors if the keys had to be touched in semi-darkness. Your bookkeeper would not attempt to balance or make entries in your books under the same conditions. The chances are everyone in your of-

fice has an incandescent lamp over his desk to turn on when needed. An office force is to a great extent unproductive, although a necessary expense. All the more reason why you should give the productive portion of your employes at least as much light as the unproductive. Do you think a molder can do as much work in semi-darkness as he can with good light? Don't you think it takes time endeavoring to turn the sunny side of an old oil torch on some particular part of a job, ramming with it, setting gaggers with and finishing a mold with its aid? Bad light is very irritating to a molder, and many the time after he gives some portion of his mold a few slicks he will say, "Oh, let it go, can't see it without light." Rough and often bad castings can be traced directly to bad light. Would it not be better, more healthy and more economical for all concerned to devise a means of conducting the free and pure light into the foundry, than to be every day large and indirect contributors to the scrap pile?

Simple matter to do it. The railroad stations furnish some splendid examples. Have a section of the roof made of wire glass and you will get the most satisfactory returns. I know of one foundry that admits light in that way, and the results are excellent. Light and ventilation are all important to the success of any foundry. These, with the total or partial abolition of the smoke nuisance, should be of prime consideration.

MANAGEMENT.

Much could be said under this caption that the limits of a brief paper like this necessarily curtails. My own experience being entirely in the machinery and jobbing foundries, I consider a competent foreman as the chief feature, one who himself is a first-class, all-round molder, not one who is first-class in some special kind of work, as a man who has had experience in only one or two shops in his lifetime is very apt to be. Avoid the specialist, as he is of necessity a one faculty man who is liable to prove himself a white elephant in any shop where the class of work is continually changing. A man of broad experience, good education and address, temperate in habits and language, firm and polite in his demeanor, generally is a student of human nature and has executive ability of a broad gauge character at his command, and is sure to produce the very best paying results in any shop that is fortunate enough to employ him.

Men can be led much easier than driven. For polite requests, kind answers and gentlemanly bearing of a foreman, men will exert themselves to the utmost to do the square thing and to oblige. Men will always kill time on the bulldozer if they can. I have worked in shops where the foreman cursed and blasphemed nine hours out of ten, and who created so much confusion around casting time that one-third of the shop's work was always lost. Such foremen are cordially hated by their workmen, and in good times, such as the present, they cannot get good men to stay. Result, more bad work and more loss for the owners. Every man kills all the time he can, and is actually glad in his heart when castings get lost, so as to get the tyrant into trouble.

On the other hand, there are many shops where the foremen are greatly respected by their men, and there is no length to which they would not go to help him get his work out. You never hear good foremen yelling and shouting, and as a consequence the men don't shout either. You never see any confusion around casting time—that particular time when every man wants to have his head about him. You see very little work lost in such shops, and you invariably see the maximum quantity of work turned out. I ask you the question, which of the two classes of men are likely to make your shop pay the best, the cool-headed, educated gentleman with his system always, or the blatant rule-of-thumb fellow with no system but his "hollering," fretting, fuming and growling?

You want the greatest possible amount of work you can get out of your men; that is natural. The more work you get out of each and every individual, the bigger and better your bank account grows. Now, what do you do towards that goal? Many of you do what is right, of course, but there are quite a number who do nothing at all other than sing out from the office, "We got to have more work." Did it ever occur to you that every molder in your shop spends over an hour every morning in the year doing laborer's work, pulling out castings, cutting sand, mixing, facing, etc., and many other hours during the day skirmishing around after gaggers, parting sand, rammers, brushes, riddles, and fixing up old flasks that should be fixed before the job was given out?

Cutting sand in the morning is a bad appetizer for a square day's work. It is the hardest hour of the day, and a tired man means carelessness, and the chances are you may have an addition to the home-made scrap pile that you would not have had the molders been feeling as a man should feel about his responsibilities. A tired body always carries an inactive mind. You would be more in pocket to keep a molder molding. Castings are money to you. If the conditions of your shop are such that a molder cannot start molding before 8 o'clock, why, you have lost the equivalent in value of the castings that he would have produced in that one hour. Laborers should do that work. Some of you no doubt will say, "Well, if we did get the sand cut up our molders would not do any more work anyway." Why? let me ask. What is he going to do with that extra hour you gave him which is to his benefit as well as your own? If you can't get as much molding done in that hour as in any other, it bespeaks bad management for which you can blame none but yourself.

You pay a molder 30c an hour and a helper

15c on an average. For every hour you keep a molder doing laborer's work you lose 15c on time alone, not to speak of the profits on what he would have produced in castings. If you have 50 molders each doing an hour of laborer's work every morning, you lose on time $6.50 per day, $39 a week, or over $2,000 a year. That would pay a good foreman. You will also probably say, "That sounds nice as a theory." I have seen it in actual practice in more than one shop, and know that it pays. All that it requires to get it in working order is a foreman in sympathy with the movement and with executive ability enough to inaugurate a system. If you are not making the money you ought to make, just look into this matter. A small expenditure at the start will pave the way to a system of general economy. I know of shops where molders do not do five hours actual molding. Does this pay? The molders don't like it; they often leave, as they say they can't get anything to work with, so, figuratively speaking, it is bad for master and man.

There are true and false economies, and it takes a practical man to discern the difference between the two. Anyone can see it sometimes. The one aim in every foundry should be for a system. You would have less bad molders if you made an earnest endeavor to improve them. The great majority of them don't read; they are of a mechanical nature. A number of you are not very far advanced as far as reading matter of interest to the foundry is concerned. The molders' mechanical and intellectual improvement will surely be to your benefit. Do you do anything in the matter? I have never known of it.

MATERIALS.

Sand should demand the greatest care in its selection. A good, strong, refractory open sand is of prime necessity in any foundry, for with poor sand much time is lost and many castings as well. A deal of time is lost in venting work which would be unnecessary in many jobs with good sand. Scabs, even if they do not spoil a casting entirely, look bad and cost money to chip off anyway. It is more difficult than many of you imagine to keep bad sand from scabbing, and cutting where the flow of the metal is greatest. I have worked in shops where with ordinary care a casting never scabbed, and again in others, with extraordinary care castings often were covered with scabs.

About the first thing a new molder will ask his partner when he starts in a shop is about the sand. If told it is bad, he invariably spends more time on his mold, and any molder who has had experience in a good many shops is always ready to admit that it takes him a week or more to get on to its eccentricities. There are many dead losses in the foundry through the medium of bad sand. The difference in price between good and bad is very little, but the difference in results, if figured up, would be astounding.

Dry sand should be better understood among foundrymen. Castings are rarely lost in dry sand if handled by competent men. It costs a little, of course, to dry a mold, but with scarcely any risk of loss and a better and stronger casting goes a long way in compensating for the little extra cost. It is an open question whether in many classes of work dry sand is not the cheapest, all things considered. A dry sand mold is always made quicker by a man that knows his business, and the materials used need not be half as costly as they sometimes are. Sweeping work is a good and cheap method which many of our foundries do not practice. They let good jobs pass their doors. Work can be swept up in green sand, dry sand and loam, but of course a knowledge of drawing is necessary on the part of the foreman and molder. Loam is often the cheapest way of making some castings, and the bricks should be of a soft quality and the sands of a good grade. Some shops go to a great deal of unnecessary expense in making loam. As good a loam as I ever used was composed of five parts of loam sand and seven parts fire sand, wet with clay wash well mixed and left lay for a day or two before using. Horse manure, sawdust and the like make it hard to mix, hard to finish, and are unnecessary as component parts of loam mixtures.

Every foundryman tries to get pig iron suited to the class of work he turns out, and generally the best suited to that purpose. Great attention is often paid to the iron. Physical and chemical tests will be made, which will prove all right, but still the castings come hard, spongy, brittle, and often crack. Iron is easily spoiled in the cupola. We pay for good iron and endeavor to see that we get what we pay for, devote a lot of our time compounding mixtures and pay no attention to the quality of our fuel. I have known shops to have the best of iron and get poor results. The reason is often found in one single lump of coke. You may discover some yellow spots plentifully distributed all through it. That's sulphur, and a mighty poor thing to come in contamination with melting iron. The fuel should be examined for defects just as severely as the iron.

Plumbago blacking, it seems, is only a memory. Molders hardly ever see or handle any nowadays. Substitutes have largely taken its place, for, like any other article that is dear, a substitute is sure to be provided. The blackings of the present day are composed to a great extent of common cement, pulverized anthracite, charcoal, soapstone and other cheap minerals, and it is a question whether they do not cost more than they are intrinsically worth. Some of them peel very well indeed, but the great majority of cheap blackings do not peel well and are difficult to work on a mold. It would be worth while for someone statistically in-

clined to figure out how much longer it took a molder to properly slick up a mold—if such a thing is possible—with a poor blacking than if he had a good quality, and see if the difference in time, not to speak of the results, would not buy a good article. Castings are certainly much harder to clean with poor blacking. If the sand fuses—as it is sure do do on heavy work—a very bad job is the result, and in addition to the molder's extra time on the mold it costs more to clean the casting, and then the results are not fully satisfactory to anybody concerned, oftentimes resulting in the loss of a valuable customer. Every foundryman should strive for that which will give his shop the name of turning out the best and nicest castings in his vicinity. 'Tis a kind of policy that easily pays, particularly shops that handle machinery castings.

TOOLS.

Assuming the fact—which is not always the case—that every shop is equipped with appliances commensurate with the financial circumstances of the firm, we will leave that matter at present and devote a few moments to the more common, every-minute, indispensable tools used in the shop, and of which there exists such a plentiful scarcity in many foundries. Shovels, riddles, brushes, rammers, clamps, gaggers, rods, wedges, weights, etc. To get the maximum amount of work, or to expect it, a man should have access to the above tools without looking around the shop for them, or waiting until someone else is done. Every molder should have at least a good shovel, two riddles, a pail, a brush and a rammer, and if it is necessary—as is sometimes the case—hold each man responsible for their condition and safe-keeping, but if you do, add in a proviso to discharge the first—and all after the first—person stealing any of the above articles.

The other things are more generally held as common property, and any shop is money—and a good deal of it—in pocket to have plenty of them. Have you ever seen a molder wait an hour until someone else was done with a rammer? Have you ever seen him wait until the last minute until someone else got poured, so as to get the clamps, not half clamp his job, have it run out, burn the flask and lose the casting?

Ever see a man a whole hour hunting up a handful of gaggers that someone else had buried in the floor for safe-keeping? Probably you haven't. Probably if you did you would not notice it. In some shops this hunting around and waiting for everything is a necessary detail of the business. It does not pay, and I challenge contradiction.

Though you may think you are running cheap, you are running dear, and you would find that it would pay you better and your molders would like you the more, if you kept them molding instead of having them chasing around after the tools you should supply them with. For a scarcity of clamps, gaggers and such tools as can be made without scarcely any cost in the shop, there is no excuse other than that of bad management.

THURSDAY AFTERNOON.

Following the adjournment of the morning session, the delegates were taken in hand by the entertainment committee, who had chartered a special train from the Santa Fe Route, which carried the visitors along the course of the drainage canal to the controlling works at Lockport, where the waters from the lake enter the Illinois river. Refreshments were served en route and stops were made at different points of interest.

THURSDAY EVENING.

A smoker at the palm garden of the Great Northern Hotel on Thursday evening proved a pleasant windup to the meeting. A most excellent vaudeville entertainment had been provided and the entertainment committee came in for a well-deserved praise.

The Exhibits.

We have illustrated on other pages the exhibits of interest to foundrymen which were to be seen at Chicago.

The Tabor Mnfg. Co., Elizabeth, N. J., showed one of their latest molding machines, the pattern on exhibition being fitted with the Vibrator frame. In addition they also showed a variety of castings of rather intricate design, which had been made on this machine.

The Standard Pneumatic Tool Co., Chicago, took advantage of the occasion to exhibit some pneumatic tools in which foundrymen are specially interested.

The Carborundum Co., Niagara Falls, N. Y., displayed a variety of Carborundum products, and a souvenir in the shape of a carborundum scarf pin was much prized by those who received it.

Brown Bros., Chicago, had on exhibition the Hammer Core Machine. As this could be seen in actual operation, it elicited more than usual admiration.

The Stirling Emery Wheel Co., of Tiffin, Ohio, showed a line of their emery wheels and also one of their No. 7 machines.

The abhorrence of notoriety is undoubtedly what prevented J. D. Smith from placing his Phoenix Talc alongside of other attractions. However, the parlor of the J. D. Smith Foundry Supply Co., in which they kept open house, was always well patronized. A handsome letter opener was given

as a souvenir by Mr. Smith in memory of the occasion.

The Garden City Sand Co., Chicago, showed a fine line of fire brick, cupola blocks, molding sand, etc.

The S. Obermayer Co. had a double show, a neat exhibit of foundry supplies in the exhibition hall, and another attraction, known as the "Dark Secret," in their headquarters, parlor L, 30. Both were well patronized.

A. Leschen & Sons Rope Co., St. Louis, showed samples of wire rope.

The Eagle Emery & Corundum Wheel Co., of Chicago, had a neat display of their product.

Convention Echoes.

A convention hall on the fourteenth story was a novelty.

B. T. Bacon's glad hand was kept busy for the first forty-eight hours.

Geo. F. Crivel was a very creditable representative of F. B. Stevens.

T. D. West sparred a few rounds for the benefit of foundry chemistry.

A good many members say they would like to go to Boston next year.

And after all, it is said that the Committee had money and plenty left over.

Dr. R. Moldenke commanded attention whenever he appeared on the floor.

John G. Sadlier can lay claim to knowing a little bit about foundry practice too.

More than one Smith was there. F. H. Smith, the Fillett man, of Akron, could not stay away.

H. F. Frohman, S. T. Johnston, E. J. Woodison and W. Fitzpatrick defended the Obermayer forts.

P. D. Sloan took good care that the name of the Garden City Sand Co. should not be lost from view.

The exhibits attracted a great deal of attention and could be made a more prominent feature of future conventions.

E. J. Woodison had a fire brick argument on tap. The Obermayer Company control the brick which furnished the text for the sermon.

W. A. Jones and Wm. Ferguson, being graduates of the sand heap, were much sought after by those who could not help talking shop.

J. D. Smith—good-natured, unselfish, fun-loving J. D. May his shadow never grow less and may he be long spared to give us a welcome.

Willis Brown, of Erie, Pa., may not have been a foundryman all his life, but there are those who have and know less about the business.

H. S. Vrooman can always be depended upon to start an interesting discussion concerning some point connected with the foundry business.

While Pridmore made no exhibit of his machines, he still managed to make nearly every delegate carry an ad. for him in the shape of a neat button.

To prove that "Coreka" is perfectly pure and healthful and handy for other things besides making cores, J. D. Smith took a drink of it occasionally.

James F. Lanigan, although residing some distance east of Boston in ye towne of Lawrence, managed to be one of the earliest foundrymen on the scene.

Obermayer's headquarters at L 30 drew a large crowd who wanted to know "A Dark Mystery." They found out. We illustrate the mystery on another page.

Francis Schumann, C. S. Bell and J. S. Seaman, the three ex-presidents, all made honorary members, and all names that any association could well be proud of.

James F. Lanigan was there and brought along with him that rich, diaphanous, fascinating and musical voice that has so often thrilled us and made its owner one of the most envied of men.

The Convention did a graceful act in its selection of a president, and it is not necessary to argue as to who is chiefly honored—the Association, Chicago, or W. A. Jones. Everybody was pleased.

H. H. Roberts was ostensibly on the Press Committee, but if there was any committee he did not serve on, we would like to know it. Mr. Roberts is a worker and a success in anything he undertakes.

Large numbers of those who were interested paid a visit to the famous foundries of the McCormick Harvester Co. It is said that the molding machine is here more thoroughly developed than in any other shop in the world.

If the Chicago Convention did nothing else than make Dr. Moldenke secretary, where he can still further make his influence felt, it would have been a great event. As it is, the bringing together the

"power" and the "opportunity" is going to make history.

J. D. Smith is always in his right element at those conventions. Some one accused him of bringing the large specimen of Phoenix Talc, which he had on exhibition, to the convention with the idea of securing new customers for this product. Of course such suspicions were only voiced by Mr. Smith's competitors.

It is funny what changes time will make in some men. It is only a year or two ago that it would have been considered impossible to have held a convention without H. F. Frohman, general manager of the S. Obermayer Co., being a central attraction from the time of the opening ceremonies until the benediction was pronounced.

But now how different. Mr. Frohman gets to Chicago the second day, hustles out to their Chicago plant, and buries himself in business details during his entire stay, with the exception of an hour off once or twice during the evening, and even then there are those who suspect he was keeping an eye on the main chance. H. F. F. is going to the front if hard work will count.

That J. D. Smith does not intend to let the Smith family lose the advantage of its long connection with the foundry supply business is evidenced by the fact that he brought along his son, Pierce G., for the purpose of training him in the mysteries of successfully entertaining foundrymen. The young man could not have a better teacher.

Dr. Moldenke's indefatigable and tireless energy,his literary attainments and superior education, are something far from ordinary, and when coupled with these his scientific inclinations and a reputation for zealous study, his record as an explorer into hitherto unknown and unattempted spheres of mechanical research, are considered, the A. F. A. can well be proud.

THE FOUNDRY is acquainted with a number of gentlemen who are and have been secretaries of various mechanical and engineering societies, and in all genuine sincerity we do not believe that any have more reason to be proud than the A. F. A. in having secured the services of that distinguished metallurgist and renowned investigator, Dr. R. G. G. Moldenke, as its future secretary.

Again we were all disappointed. Howard Evans was still detained on account of poor health from meeting the scores of friends who keep looking forward to these assemblings as giving promise of their meeting one who must always be honored as being in a measure the father of the Foundry Association movement. There have not been many men who have made a more enviable name for themselves among the foundry trade than Howard Evans; none have more friends among the foundry fraternity, and there are scores who do not care what the molding sand costs or how good the plumbago is as long as it comes from the Paxson Company.

The unusual spectacle of a quartet of supply men arguing as to the reason for using a certain product which they sell in large quantities was seen the day previous to the opening of the convention. This oratorical contest took place at J. D. Smith's headquarters, known officially as L 56, and besides being participated in by that gentleman was held down on the other three corners by Messrs. Vrooman, Woodison and Matthews. One claimed that sea-coal vented a mold, the second that it made the sand porous without venting the mold, the third that this material was used simply to peel the casting, the fourth that as a general rule it was useless all around and accomplished but few of those things for which it is commonly given credit. We will leave it to the reader to place the right man in the right position upon this controversy. Let us add that the closing argument on this subject is not yet in.

The Detroit Conference of the National Founders' Association and the Iron Molders' Union.

During the past year, when almost every other trade has been more or less affected by serious labor disturbances, the foundry business has fortunately escaped any serious interference with its progress.

There can be little doubt that but for the formation of the National Founders' Association the past twelve months would have witnessed more than one serious struggle between foundrymen and molders. The activity in all trades has until within the past two months been something quite unknown in a decade, and the foundries have experienced a demand far out of the usual course. At the same time, it must be conceded that

the price of castings never advanced in proportion to the cost of raw material and labor, and with the declining market we are now witnessing it is not unlikely that concession in the price of castings and possibly the partial closing of plants will be necessary.

The molders of the country have quite outdone any previous performance in perfecting their organization, and had it not been that a similar powerful body of foundry operators had joined themselves together for the common good of all, many individual foundrymen would have had to face demands, far beyond endurance in certain localities.

That the formation of the National Founders' Association has had a restraining influence upon the molders could be no better exemplified than through the conferences which have been held within the past two months. As will be remembered, the molders of Cleveland, Cincinnati and Chicago, together with a number of other cities in the same territory, made a demand upon their employers May 1st for an advance of 25 cents per day, making the minimum rate of wages for floor molders $3.00 per day. At that time there was already signs of a lessening demand for foundry products, and at the conference in Cincinnati between the National Founders' Association and the Iron Molders' Union the weakening of prices was urged against the molders' demand for increased wages. However, to show a spirit of fair play, and also to secure sufficient time in which to demonstrate to the molders that the falling-off in demand was not temporary, it was agreed that an advance of 10 cents per day should be paid the molders during the months of May and June, and that a further conference should be held before the expiration of this period.

This conference began in Detroit, June 12, and remained in almost continuous session for the following five days. The molders were represented by Jos. F. Valentine, first vice-president; M. J. Keough, second vice-president; David Black, editor Iron Molders' Journal; John Campbell, Quincy, Ill.; Jas. S. Flanagan, Elizabeth, N. J.; M. B. Lavery, Brantford, Ont.; Wm. Noll, Chicago; Jas. H. O'Neil, Providence, R. I.; Geo. W. Greig, Denver, Col., while the following represented the National Founders' Association: O. P. Letchworth, Pratt & Letchworth Co., Buffalo, N. Y.; W. H. Hoyt, Gates Iron Works, Chicago; D. McLaren, United States Cast Iron Pipe & Foundry Co., Addyston, O.; Antonio C. Pessano, Geo. V. Cresson Co., Philadelphia; Joseph A. Stone, Riverside Foundry Co., Cleveland; Geo. Q. Thornton, Carondelet Foundry Co., St. Louis; John R. Russel, Russel Wheel & Foundry Co., Detroit; W. H. Pfahler, Abram Cox Stove Co., Philadelphia; John M. Taylor, Dominion Radiator Co., Toronto, Ont.

The first business brought before the conference was the wage question, the molders renewing their demands for a minimum rate of $3.00 per day for floor molders. The foundrymen were thoroughly convinced, after making a careful canvas of conditions in all parts of the country, that there was no immediate prospect of a general activity in the trade, but in spite of the fact that everything pointed towards a lower basis, they were willing, in a spirit of liberality more than actual justice, to concede the same rate of wages for 1900-1901 as had been in force previous to May 1st. This proposition the representatives of the Iron Molders' Union refused to accept, and after a tie vote it was decided that the question of compensation should be left open.

In order to define its position, the National Founders' Association, through its president, Mr. O. P. Letchworth, introduced the following resolution, previously affirming its support of the "New York Agreement":

"That inasmuch as the individual molders' capital is represented principally by his labor, we recognize his right and privilege to work for whom and where he pleases, and the justice of his being a party to the agreement determining what compensation shall be paid him for such capital or services, and that in any and every agreement relating to the question of compensation the molder shall be accorded the right of deciding, in connection with the employer, what shall be the amount of such compensation; that in his failure to secure what he believes to be just compensation, the question of such compensation shall be submitted to a committee of arbitration, composed of an equal number of representatives of the Iron Molders' Union and the National Founders' Association, and the findings of such committee as to the amount of such compensation shall be accepted by both interested parties.

"That, inasmuch as it is the employer's capital alone that is invested in his business, there shall be accorded to him the right to determine the manner and method

in which such capital so invested shall be operated, and to him shall be accorded the right and privilege of employing whom he may please at such price as may be mutually agreed upon, and at such work or class of work as he may decide, and for such length of time as he may elect, provided that he does not in any such arrangement do an injustice to the individual rights of his employees as American citizens.

"That, inasmuch as it is the employer's money that is being paid for such compensation, there shall be accorded to him the right to elect the method by which such compensation shall be determined, whether by the time worked, or by the amount of work performed, which latter is commonly known as piece-work, with the proviso that should this latter system of compensation be adopted, in any case in which the molder believes that either improper compensation, unjust accounting or any other irregularity in connection with the system is being practiced, he shall have the right to ask for a hearing before an arbitration committee, as previously provided for.

"That, inasmuch as the molding machine is the product of the machine shop and not of the foundry, it is not under the jurisdiction of the molder, but having been produced at the expense of the employer, there shall be accorded to him the right to operate it in whatever manner he may elect, the same as his right to operate his power plant, cranes or any other mechanical devices which have been brought into the foundry for the better prosecution of the employer's and molder's joint interest."

The molders, too, affirmed their belief in the justice of the New York Agreement, but offered the following as a substitute for the resolutions printed above:

"That, inasmuch as the individual molder's capital is represented principally by his labor, we recognize his right to combine his individual interests in order to secure the most profitable investment of such capital; and further recognize the right of the individual molder, or of such organization acting for the individual, to determine for whom, with whom and under what conditions of labor he shall be required to work, and the justice of his being a party, either individually or through his organization, known as the Iron Molders' Union of North America, or any of the several local unions thereof, to any agreement determining what compensation shall be paid him for such capital or services, or determining under what conditions of labor he shall be required to work, and that in any and every agreement relating to such questions, the molder, either individually, or through his union as aforesaid, shall be accorded the right of deciding in conjunction with the employer what shall be the amount of such compensation, or the nature of such condition; that in the event of failure to secure what is believed to be just compensation or agreeable conditions, the question involved shall be submitted to a committee of arbitration, as provided under the terms of the 'New York Agreement.'

"That, inasmuch as it is the employer's capital alone that is invested in his business, there shall be accorded to him the right to determine the manner and method in which such capital so invested shall be operated; and we recognize the principle that he has the inherent right to employ whom he may please at such prices as may be mutually agreed upon, and at such work or class of work as he may decide, and for such a length of time as he may elect; provided that he does not in any such arrangement do an injustice to the individual or collective rights of his employees as American citizens, or as set forth in this resolution, or act in violation of any agreement affecting wages or conditions entered into with his employees or their organization.

"That, inasmuch as there are, generally speaking, two methods by which compensation for labor is determined, the day work and piece price system, and it is recognized that both the employer whose money is invested, and the employee whose labor is invested, are equally interested in determining which of these methods shall prevail, and we also recognize that there are certain classes of work in the foundry to which by reason of its difficulty, uncertainty and general character, the piece price system cannot be equitably applied, nor applied so as to conserve fully the interests of the molder, and are therefore of the opinion that whenever a question affecting the method of compensation arises between members of the Iron Molders' Union of North America and the National Founders' Association, due consideration should be given to this point, and preference accorded the day work system, in such cases as those cited above. Provided, however, that all such questions shall be likewise subject to a hearing before an arbitration committee as provided for in these resolutions.

"That, inasmuch as the molding machine is but an improved tool, designed to cheapen and increase the product of the molder, and represents both additional capital invested by the foundryman in his business, and a different method of applying and utilizing the capital of the molder, we recognize that each is mutually interested in its manner of operation."

The foundrymen proposed the acceptance of their resolutions in a modified form as follows:

"That, inasmuch as the individual molder's capital is represented principally by his labor, we recognize his right to combine his individual interests in order to secure the most profitable investment of such capital;

and the justice of his being a party, through his organization, known as the Iron Molders' Union of North America, or any of the several local unions thereof, or any other union, to any agreement determining what compensation shall be paid him for such services, and that in any and every agreement relating to such questions, the molder, either individually or through the unions as aforesaid, shall be accorded the right of deciding in conjunction with the employer what shall be the amount of such compensation and under what conditions such services shall be performed; and all employees who shall elect to receive the compensation agreed upon shall work peacefully and harmoniously with all fellow employees, and if he elects to leave the service he shall not undertake to interfere in any manner with the operation of the shop or works of his late employer; and that in the event of failure to secure what is believed to be just compensation the employee or employer shall have the right to appeal the question at issue to a committee of arbitration as provided under the terms of the "New York Agreement.'

"That, inasmuch as there are, generally speaking, two fair methods by which compensation for labor is determined, namely, the hour and piece price system, and as it is the employer's money that is invested, it is his privilege to determine which of these methods shall prevail, and we also recognize that there are certain classes of work in the foundry to which by reason of their difficulty, uncertainty and general character, it is difficult to apply the piece price system; we are therefore of the opinion that whenever a question affecting the method of compensation arises between the employer and the employee due consideration shall be given to this point; provided, however, that all such questions as affect the interests of members of the I. M. U. of N. A. shall be subject to a hearing before an arbitration committee as provided for.

"That, inasmuch as the molding machine is an improved tool, designed to cheapen and increase the product of the foundry, and represents additional capital invested by the employer in his business, it is the right of the employer to operate it in whatever manner he may elect."

It will be noticed from these resolutions that while the foundrymen were willing in all cases to arbitrate the question of compensation, they were a unit in demanding that the method employed in operating a shop, whether day work or piece prices were paid, was one which should be left to them entirely. On the question of molding machines the foundrymen were equally firm, insisting that the machine is a mechanical device over the operation of which the molder should claim no control.

While the conference adjourned without reaching any final agreement on the main points of contention between the respective organizations, it is not believed that any serious contests for wage advances will be made. The past has shown that it is futile to attempt to enforce any radical demands at a time when general trade conditions do not warrant compliance with same.

Deaths.

James Dougherty, for many years a prominent iron founder, and one of the oldest members of the Union League, died recently in Philadelphia. Possessed of a sturdy constitution, he enjoyed excellent health until quite recently.

Mr. Dougherty was born in Cecil county, Maryland, in October, 1815. When a youth he moved to Dayton, Ohio, and evincing a desire to learn the iron foundry business, he entered an establishment in Dayton. Soon after he journeyed to Cincinnati, where he spent some time in the foundry of Graham & Coon. So rapidly did he advance, that at the age of 20 years he was tendered the post of manager of the iron foundry of Shreve & Co., in Louisville. Afterwards he went to New Orleans, where he was offered the position of superintendent of Leeds & Co.'s foundry, but declined, and in the spring of 1837 came north, becoming superintendent of the iron foundry of George Wolf, at Columbia, Pa.

About this time Mr. Dougherty was experimenting on a new invention, called a "double plate car wheel." He had it patented, and the invention, with a few later modifications, proved highly successful. In 1840 he came to Philadelphia as manager of Wolf's foundry, at Thirteenth and Buttonwood streets, where castings were made for locomotive work. In 1842 he was engaged by Norris & Co., locomotive builders, to erect and superintend a foundry, and the firm induced him to proceed to Vienna, Austria, to act as superintendent of its establishment in that place. He remained in Vienna two years, during which he enlarged the plant, besides superintending the casting of the "retaining plate" for the large suspension bridge over the Danube at Pesth, Hungary.

In 1848 Mr. Dougherty returned to the United States, after a tour through Europe, and, learning that his patent had been infringed upon, brought suit against the par-

ties in Boston. He had for counsel Daniel Webster and Benjamin Curtis, and after winning his suit, the patent expired and was never renewed. He was next engaged as manager of Merrick & Towne's foundry, in Philadelphia, during which time he constructed the ship-building plant of Reaney, Neafie & Co., now the Neafie & Levy Company. He had an interest in this firm until 1853, when, with William B. Bement, he laid the foundation of the "Industrial Works," which name he bestowed upon the enterprise. He was also interested in the Machine Tool Works, but in 1871, when the Industrial Works became known as Bement, Miles & Co., he retired from active business.

Edward D. Steele, vice-president and treasurer of the Waterbury Brass Company, died on May 23 at his home in Waterbury, Conn., aged 62. He was born at Lima, N. Y., and began a long and successful business career in Waterbury when a young man. Besides his connection with the Waterbury Brass Company, Mr. Steele was identified with several of the city's leading industries. He served in the Connecticut State Senate in 1897.

John Fullerton, a well-known brass founder of Philadelphia, died on May 27 at his home in that city, aged 74 years. Mr. Fullerton was the head of the Fullerton Rolling Mill Company, with a brass foundry and smelting works at 38 East Girard avenue, Philadelphia, and was also president of the Altoona Iron Company, of Altoona, Pa.

John Morrill died June 3, at Bangor, Me., aged 67. He was foreman of the Noyes & Nutter foundry, going there from the Bangor Foundry & Machine Co.'s establishment, where he had been employed for a long term. He began his career at Hinckley & Rollins', then of Harlow street, then going to the Bangor Foundry & Machine Co.

Walter G. Morrison, aged 54, died recently in Stonington, Conn. Mr. Morrison started a small machine shop in Willimantic that increased its business until it was incorporated under the name of the W. G. & A. R. Morrison Company. The company built up a large business, but became financially involved and was forced to go into insolvency. In 1895 a new company was organized under the name of the Morrison Company, in which Mr. Morrison was manager. In 1898 it was consolidated with the Atwood Company, and a new organization perfected under the name of the Atwood-Morrison, with headquarters at Stonington. At the time of his death Mr. Morrison was a director and vice-president of the latter company, and had supervision of the drafting and inventing department.

C. D. Skene, a foundryman of exceptional ability and at the time of his death superintendent of the malleable department of the York Mnfg. Co., died at York, Pa., recently.

Fires.

The Fergus Iron Works, at Fergus Falls, Minn., was damaged by a recent fire.

The Cleveland (Ohio) Foundry Co. was visited by a small fire some time ago

The Chickasaw Iron Works, of Memphis, Tenn., had their pattern room destroyed by fire June 5.

The Carondelet Foundry Co.'s plant, at St. Louis, Mo., was considerably damaged by a recent fire.

The foundry of The A. Hallman Stove Co., Philadelphia, was damaged to the extent of $6,000 by fire.

The brass foundry of The James Morrison Brass Mnfg. Co., at Toronto, Ontario, was scorched June 2.

The Occidental Foundry, at San Francisco, Calif., lost a large number of valuable patterns in a recent fire.

The machine shop and foundry at Skowhegan, Me., owned and managed by the Island Machine Company was destroyed by fire June 7, causing a loss of $5,000, with no insurance.

Personal.

J. S. McCormick, president of the J. S. McCormick Co., Pittsburg, will make a tour of Europe and the Paris Fair.

Charles Spence is foreman of the new foundry lately built by the Beckwith people at Dowagiac, Mich. Glenn Mead is in charge of the old plant.

Oliver Phelps, of Detroit, formerly connected with the Michigan Peninsular Car Co., has become general manager of the Lorain Foundry Co., Lorain, O.

Mr. J. W. Duntley, president of the Chicago Pneumatic Tool Company and the New York Air Compressor Company, has just returned from a successful trip to Europe.

J. W. Welsh, formerly with the Robinson Machine Co., of Pittsburg, and the Mesta Machine Co., at Homestead, Pa., has accept-

ed a position as foundry superintendent with the Siberling Plate Glass Co., at Ottawa, Ill.

J. N. Maher, formerly superintendent for the Benjamin Atha & Illingworth Company, Newark, N. J., has been appointed superintendent of the Scullin-Gallagher Iron & Steel Company, St. Louis, Mo.

Among the Foundries.

George Grennon will start a foundry at Hallock, Minn.

The Adams Bros. Co. are erecting a new foundry at Findlay, O.

The Ideal Mfg. Co., of Detroit, Mich., are erecting a new foundry.

The Landis Tool Co., Waynesboro, Pa., are building a new foundry.

G. A. Russell has purchased the Morristown (Tenn.) stove foundry.

The Heck & Marvin Foundry at Findlay, Ohio, is increasing its capacity.

R. R. Kinread is reported as intending to start a foundry at Waverly, Mass.

The Harmon Machine Co., of Watertown, N. Y., is remodeling its brass foundry.

The Sumpter Engine & Foundry Co. has been incorporated at Sumpter, Oregon.

The Mutual Supply and Equipment Co. will start a foundry at Greensburg, Pa.

The Otay Mfg. Co., of Otay, Cal., is reported as intending to build a small foundry.

The American Foundry Co., St. Louis Park, Minn., is a new concern in the foundry business.

The Western Gas Construction Co., of Fort Wayne, Ind., has erected a foundry for the manufacture of its own castings.

The Vulcan foundry, which started business in Pawtucket, R. I., a few years ago, has decided to close, having found it unprofitable.

The L. E. Hoyt Co. has been incorporated at Walton, N. Y., with a capital of $30,000 by L. E. Hoyt, M. L. Stanton and E. J. Brooks.

The South Side Foundry & Machine Co., of Charleston, W. Va., succeeds to the business formerly carried on by O. A. & W. T. Thayer.

An addition to cost $15,000 is to be built by the Illinois Malleable Iron Company to its plant at Chicago. It is to cover 151x80 feet of ground.

The Bing Foundry & Machine Co. has started in business at Camden, N. J. The incorporators are: J. H. Bing, A. D. Root and J. McGlathing.

The Pierce, Butler & Pierce Mfg. Co., of Syracuse, N. Y., is building an addition to their foundry to be used exclusively for the molding of radiators.

The Suburban Foundry Company, of Syracuse, has been incorporated to conduct a general iron foundry. The directors are: Myron J. Hayden, James F. Fay and George Hessler, of Syracuse.

The Barnes Lock & Foundry Co. has been organized at Bayonne, N. J., with a capital of $30,000 by D. Nunan, J. B. Cowper, F. C. Mahuken, E. Stagg, all of Bayonne; C. Christie, attorney, Jersey City.

The contract to build a fire proof foundry building, 65x205 feet, at the Portsmouth navy yard has been awarded to Connor Brothers, of Lowell, for $39,226. It must be completed in eight calendar months.

The Prentiss Mfg. Co., of Marinette, Wis., have leased the foundry of the Lippert Iron Works, at Kenosha, Wis., and will engage in a general foundry business, besides making a specialty of wagon skeins.

The Minnesota Malleable Iron Company, Minneapolis, Minn., have been incorporated with a capital stock of $150,000. Lewis S. and George M. Gillette, Frank J. Llewellyn, A. Y. Bayne and P. Lees, of Minneapolis, are the incorporators.

The Humeston Mfg. Co. has been incorporated at Humeston, Ia., and will carry on a general foundry business. The officers are J. D. Hasbrouck, President; W. J. S. Taylor, Vice-President; J. E. Doze, Secretary; E. F. Humphrey, Treasurer.

Owing to ill health, Martin Dew, of the Cass City Foundry, at Cass City, Mich., has disposed of his plant to a new concern consisting of J. H. Striffler, Chris. and Wm. Schwaderer, A. H. Muck and Ed. Brotherton. Several enlargements are contemplated.

The Monessen (Pa.) Foundry and Machine Co. have recently re-organized their company, Mr. William Bumbaugh having been elected President, vice W. A. Mazurie resigned, and Robert R. Chrissman, Secretary and Treasurer. The company will make extensive improvements to their plant.

Al. Hood and George Hayes, of Birmingham, Ala., have purchased a controlling interest in the Sheffield Foundry & Machine Company, at Sheffield, Ala., and will incorporate under the name of the Sheffield Iron

Works, with a capital stock of $10,000. The plant at Sheffield will be improved and will be put in position to do general machine and foundry work.

At a recent meeting of the stockholders of the Sheridan Stove Company, Quincy, Ill., Joseph L. Sheridan was elected president, and Stephen Mueller vice-president. The company have leased the plant of the old Wellman-Dwire Tobacco Company. Work at the making of patterns and flasks has been commenced and operations will be begun as rapidly as possible. Sixty men will be employed at the starting.

The Pittsburg Plate Glass Company has just completed at its Ford City plant one of the largest and finest foundry and machine shops in the Pittsburg district. The new plant has cost altogether about $250,000, and will consist of a foundry 200 feet long and 68 feet wide; machine shop, 200 feet long by 100 feet wide; pattern shop, 80 by 150 feet; blacksmith shop, 75 feet wide and 90 feet long. In the shops are installed two ten-ton electric cranes and two ten-ton cupolas.

The Pittsburg Foundry & Machine Company, 31st street and Liberty avenue, Pittsburg, has elected R. M. Davis, Grant Darby and W. A. Smith, liquidating trustees, and will go out of business. The foundry department has been idle for some time and the machine shop has been run with a small force. William Velte, the president, has recently formed the Velte Foundry & Machine Company, to locate at Home and Hatfield streets, Pittsburg, and this has been the main cause of the determination to wind up the affairs of the Pittsburg company.

The Maywood Foundry and Machine Co. will soon start work on a big manufacturing plant at Maywood (Ill). The plans, prepared by M. J. Morehouse, provides for a two-story foundry, 150 by 65 feet, with an extension of 40 by 30 feet; a two-story machine shop, 100 by 150 feet, and an engine house. The building will be of fireproof construction, no wood of any description to be used, and as a novelty in this class of structures the exterior will be of vitrified glazed tile. The cost, including equipment, will be in the neighborhood of $100,000.

By the death of John Martin at Yankton, S. Dak., the foundry and machine interests have practically been left without a head, and the Commercial Club of that place has taken the matter up and proposes to establish a first-class foundry and machine shop. They wish to place themselves in communication with some thoroughly competent business men and mechanics who are looking for a good business opening. The club stands ready to aid any good enterprising men who will take advantage of this opportunity. Address Frank Van Tassel, Secretary, Yankton, S. Dak.

The Atchison, Topeka & Santa Fe Ry. Co., contemplates the erection at Topeka, Kan., in the immediate future, of an extensive machine and erecting shop, a forge shop, a boiler shop and a car wheel foundry. These extensions have been found necessary in order to cope with the vast amount of work which necessarily accumulates at the headquarters of so large a system. The citizens of Topeka have subscribed funds sufficient to purchase the site needed and it is expected that the erection of the foundry and boiler shop will commence within a couple of months.

The charter of the Cherry Valley Iron Company, Pittsburg, has just been issued, with $350,000 capital stock. The company has an office in the Murtland Building, Pittsburg, and has purchased the blast furnace and coke plant of the Cherry Valley Iron Works, Leetonia, O. This is a 75x16′ stack, making about 175 tons of foundry and forge iron daily. The new company will likely increase the capacity of both furnace and coke plant. The directors are Joshua W. Rhodes, L. W. Young, R. W. Flenniken and W. B. Rhodes, all of Pittsburg, and Edward N. Ohl, of New Castle.

The council at Ypsilanti, Mich. have granted the petition of John S. Moore, of Charlotte, for the lease of the south wing of the water works building for a foundry plant. It is understood that everything has been put in shape for the removal of the plant to Ypsilanti. The new concern will probably be known as the Ypsilanti Manufacturing Company, and will be composed of John S. Moore, a former Ypsilantian, and I. N. Swift. The new company will manufacture Mrs. Potts' sadirons and gas plates and flat-wicked lamp cooking stoves, specialties sold only to jobbers. The plant will employ from 50 to 75 men.

The growth of the independent rod and wire mills in all parts of the country has been so wonderful that the Braddock Machine & Manufacturing Company, Pittsburg,

Pa., which makes a specialty of wire mill equipment, have been compelled to build an entirely new plant of greatly increased capacity. Even with this large plant sufficient orders are on hand to keep the works running to their full capacity for fifteen months. The Braddock Company have had in charge most of the important contracts for wire and rod mill equipment. The capital of the company was made $200,000, and a foundry for the manufacture of gray iron castings was started in Braddock. This foundry is 200x80 feet, and will have a daily capacity of fifty tons of castings. The machine shop is 317x60 feet.

The plant of the Chill Roll Foundry Company, Incorporated, at Apollo, Pa., owned by the Apollo Iron & Steel Company, is to be removed from Apollo to Vandergrift, and a much larger plant erected at the latter place. A contract has been given to the McClintic-Marshall Construction Company, Park Building, Pittsburg, for the erection of the main building 400x140 feet, and a roll turning shop 90x200 feet. Both buildings will be of steel frame construction with brick walls and slate roof. The contracts for the electrical machinery have been awarded to the Westinghouse Electric & Mfg. Company, East Pittsburg; engines will be furnished by the Buckeye Engine Company, Salem, Ohio, and the Babcock & Wilson Company, New York City, will furnish the boilers. The latest type of conveying machinery will be installed and everything built of the best material.

Porous Castings.

BY R. P. CUNNINGHAM.

In the June issue of THE FOUNDRY the question is asked by the Peterson Engineering Co., "How to overcome the difficulty of porous castings?"

I should advise them to change the mixture of their iron. One could judge better if they would give a better description of the casting. They do not say whether there is a core in the casting or not, as a casting will come porous if it is not properly vented or by an imperfect core. But in either case it would show on the surface of the casting.

If they should use an iron fairly high in manganese and low in silicon, I think they will not have any trouble in getting sound castings.

I have never heard of any coating that could be put on the surface of a casting to make it water tight under 300 pounds pressure.

Printed Matter Received.

Special catalogue for distribution at the Paris Exposition, published by the Chicago Pneumatic Tool Co., Chicago. Illustrated throughout by half-tone cuts, with a description of each tool printed in English, French and German.

Catalogue describing the Economic Molding Machine, manufactured by the Syracuse Malleable Iron Co., Syracuse, N. Y. Shows examples of work made thereon. A copy will be sent to interested foundrymen upon application.

Lecture on "The Application of Mechanical Draft to Stationary Boilers," by Walter B. Snow. Free copies may be obtained from the B. F. Sturtevant Co., Boston, Mass.

"Like This," a booklet issued by Gould & Eberhardt, Newark, N. J., showing the strong points of Eberhardt's Sand Sifters. Copy may be had upon application.

Catalogue of the Standard Pneumatic Tool Co., special edition for distribution at the World's Fair in Paris.

News from the Trade.

To show the rapidity with which pneumatic tools are being adopted, the Chicago Pneumatic Tool Co. state that if all the Long Stroke Pneumatic Hammers sold by them had been put to driving rivets in a straight line, instead of going to work in all the different branches of industries, they would have driven a line of rivets, three inches apart, 150,000 miles long, or more than six times around the world at the equator.

The Clayton Air Compressor Works, No. 26 Cortlandt street, New York, have recently perfected a new type of Duplex Belt Air Compressor. These machines are built in small and medium sizes, and embody all of the latest improvements. Information and particulars will be furnished upon application.

The Philadelphia Pneumatic Tool Co., of Philadelphia, report that they have been compelled to double the capacity of their shops since January, and that their tools are in continual demand.

We have received from S. R. Church, 307 Sansome street, San Francisco, Calif., a large number of advance sheets of "Pig Iron Analyses," which Mr. Church is now compiling. The work is nearing completion, and will be ready for delivery in August.